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INSTRUCTIONS FOR MOUNTING, USING, AND CARING FOR

DISAPPEARING CARRIAGE

L. F., MODEL OF 1905 M1

FOR

6-INCH R. F. GUNS

MODELS OF 1903, 1905, AND 1908

(*NINE PLATES*)

OCTOBER 29, 1908
REVISED APRIL 30, 1917

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War Department,
Office of the Chief of Ordnance,
Washington, April 30, 1917.

This Manual is published for the information and government of the Regular Army and National Guard of the United States.

By order of the Secretary of War:

William Crozier,
Brigadier General, Chief of Ordnance.

362119

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INSTRUCTIONS

FOR

MOUNTING, USING, AND CARING FOR DISAPPEARING CARRIAGE, L. F., MODEL OF 1905 M1, FOR 6-INCH R. F. GUNS, MODELS OF 1903, 1905, AND 1908.

(NINE PLATES.)

[The parts in *italics* are of particular importance or concern the safety of the carriage and should be specially noted.]

[The important changes in this pamphlet are shown in boldface type.]

GENERAL DESCRIPTION.

THE EMPLACEMENT (Plate I).—Emplacements for these carriages are entirely of concrete and can be arranged for a maximum field of fire of 170 degrees. This limitation is not due to the inability of the carriage to traverse through 360 degrees, but to the requirements of parapet protection for the matériel and cannoneers. The anchor bolts are set in the concrete during the construction of the emplacement, the depressions for the thrust plates being also provided in the top surface. Access to the counterweight well is given by a vertical shaft in the rear and outside of the base ring.

THE CARRIAGE (Plates II, III, IV).—These carriages are numbered from No. 11 up; they differ from models of earlier dates for mounting the same caliber guns chiefly in having the following features, viz, a single vertical recoil cylinder, retraction by gears, increased preponderance of counterweight, a counter-recoil system independent of the recoil system, and gears on the recoil rollers.

Stops can be arranged so as to permit traversing either 60, 70, 90, or 110 degrees either side of the "front" of the battery, and the piece can be elevated from 5 degrees depression to 15 degrees elevation, stops being arranged to limit the depression to either horizontal or 2.5 degrees when the height of the parapet requires it.

When, in the execution of mechanical maneuvers, it may become necessary to traverse the piece breech to the front, which can be done with the gun in battery, the fixed stops must be removed and care exercised that the weights do not foul the flexible conduit in the pit and that the carriage is traversed back the same side so as to take out the half turn given by the breech to the front.

The elevating system is so constructed that the gun is at an angle of about 5 degrees elevation when recoiled to the loading position from any angle of elevation in battery.

ACTION OF CARRIAGE.—Upon firing the piece the gun-lever axle is moved to the rear by the recoiling energy of the gun, carrying the top carriage with it. The lower ends of the levers move vertically upward, being constrained by the crosshead and bottom plate traveling on the vertical guides. The trunnions of the gun move downward and to the rear in the arc of the ellipse. The energy of recoil is absorbed partly by raising the counterweight and partly by the movement of the masses up the inclined chassis rails, but principally by the resistance of the recoil cylinder; and when the gun comes to rest it has the proper loading angle. After loading, the retracting clutches are released by the tripping gear, and the excess of the moment of the counterweight over the moment of the gun, etc., enables it to raise the gun to the firing position.

PRINCIPAL PARTS.—The carriage consists of the following principal parts, namely, base ring, traversing roller system, racer, dust guards, azimuth circle and pointer, chassis and transoms, vertical guides and supporting brackets, top carriage, recoil rollers, counter-recoil buffers, buffer valve, gun levers and axle, crosshead and counterweight, recoil system, retracting gear, tripping gear, elevating system and counterbalance device, traversing system, sighting platform, sight, lighting apparatus, firing apparatus, and grease cups. The accessories consist of shot trucks, shot tongs, and implements.

BASE RING.—The base ring, 11 feet in diameter, is made of iron cast in one piece and is held in position on the foundation by twelve 1.75-inch bolts. Twelve screws for leveling the base ring are set against steel plates through which the foundation bolts pass.

The base ring, in addition to having the lower roller path on its upper surface, has an annular flange near its inner edge forming the pintle for the carriage. This flange has near its top edge a lip inward under which the three clips engage, and on its top edge the azimuth circle. The inner upper edge of the lip is rabbeted to receive the inner dust guard. The outer annular flange on the ring projects upward outside of the traversing rollers. The cavities on each side of the roller path are drained into the pit.

Tapped holes can be found inside of the pintle flange for attaching the traversing stops in any required position.

The base ring is marked "front" in raised letters cast on the outer annular flange.

Traversing-roller System.—The racer rests, and is traversed, upon a circle of twenty-four live, conical traversing rollers whose axes are maintained in the radial position by bearings bolted to the distance ring. The rollers are of forged steel, solid, with a journal beyond each end and with flanges on their inner, small ends.

The distance ring is of cast steel, in four sections, bolted together. The bearings for the traversing rollers are formed with a loop on top by means of which any roller with its bearings can be lifted out of the ring through the two holes in the top of the racer.

The system is kept concentric with the pintle by the flanges on the rollers in centrifugal contact with the inner edge of the roller path on the base ring. The inner edge of the path on the racer is of a larger diameter so as not to come in contact with the flanges.

Racer.—The racer is made of iron 10 feet 3 inches in diameter, cast in one piece.

It is of box section, and, in addition to having the upper roller path on its under surface, has an annular flange lined with bronze near its inner edge and fitting over the pintle, with 0.04 inch diametral clearance.

Upon its top surface the chassis and transoms are bolted, doweled, and keyed.

An opening sufficiently large for removing a traversing roller is provided at each side of the racer. These holes are habitually kept covered by steel plates provided for the purpose. Four oil holes, passing through the racer, are provided for oiling the pintle surfaces and fourteen for oiling the traversing roller bearings.

Two steel clips secured to the racer near the front and one in the rear engage under the lip inside the pintle of the base ring to prevent possible overturning. The rear clip extends downward, forming also the stop lug engaging the traversing stops and providing a bearing for the traversing pinion shaft.

Dust Guards.—The outer dust guard consists of a steel angle in four sections with its horizontal flange bolted to the outer part of the base ring. To the vertical flange is clamped a projecting strip of felt which bears against a finished surface on the under side of the racer.

The inner dust guard is formed similarly by a strip of felt clamped to the inner upper portion of the base-ring pintle.

These guards exclude dust from the traversing rollers and roller paths. The dust-guard sections with their felt strips are easily removed.

Azimuth Circle and Pointer.—A brass azimuth circle, attached by countersunk screws to the top of the pintle of the base ring, is graduated in degrees, the numbers of which are to be added after the carriage is erected in its emplacement. The top of the racer is cut away on the right side to expose the azimuth circle and the micrometer pointer and the subscale, fastened to the racer. The subscale has slotted holes to give it a lateral motion for adjustment, after which it is fixed in position by two dowels. It is graduated and stamped in decimals of a degree, the least reading being 0.1 of a degree. The micrometer screw, actuating the pointer, is graduated to a least reading of 0.01 of a degree. The subscale and pointer are protected by a hinged bronze cover.

To adjust the azimuth pointer, point the gun by the bore sights on a target, the exact azimuth of which is known, set the pointer to read the hundredths of a degree in the azimuth reading, loosen the securing screws, move the pointer bodily until the reference mark on its moving part exactly coincides with a degree mark on the azimuth circle, then secure in position. The degree mark should be stamped with the number indicating the azimuth bearing in degrees and the remainder of the azimuth circle should be stamped with numbers from this point as a reference.

CHASSIS AND TRANSOMS.—The chassis of cast iron, are bolted, doweled, and keyed to the racer and are united at their front and rear ends by cast-steel transoms, also bolted to the racer. The rear transom carries the elevating slide and gearing. The upper surfaces of the chassis form the recoil-roller path and slope 1 degree and 20 minutes to the front to facilitate the return of the piece to the firing position, thus reducing the necessary preponderance of the counterweight.

Four forged-steel racks, in which the gears on the recoil rollers engage, are secured to the upper surfaces of the chassis, one on each side of each roller path. *These racks are not to be removed.*

The chassis also provide the necessary bearings or supports for all the mechanism and, with the racer, supports for all the minor attachments.

VERTICAL GUIDES.—A cast-iron guide frame is bolted to the underside of each chassis opposite the counterweight. The lower ends are joined by the piston-rod beam. The inner faces of the guide frames and chassis form continuous finished surfaces, to which are bolted two vertical guides for the crosshead and bottom plate.

The vertical guides extend above the chassis, the left guide is supported by the sight standard and the right guide by a bracket bolted to the chassis.

TOP CARRIAGE.—The top carriage is of cast steel, in one piece. It consists essentially of two side pieces, united by a transom. Two bronze-bushed bearings for the gun-lever axle are formed in the upper part, to which the axle caps are bolted. On the under side are two roller paths. Four steel racks, in which the gears on the recoil rollers engage, are secured by screws to the under side of the top carriage, one on each side of each roller path. *These racks are not removable.*

Recesses are cast in each side of the top carriage near the front, in which pinch bars, inserted through openings in the sight standard and guide bracket, can be engaged to force the top carriage forward against the stops, if for any reason it should fail to return fully into battery.

RECOIL ROLLERS AND ROLLER CAGES.—The top carriage rests on 18 live recoil rollers on each side, held in alignment by steel roller cages. They move to the rear with the top carriage at half its speed. The recoil rollers are of forged steel and each alternate one has flanges which serve as guides. Each flanged roller is provided with gears which engage in the racks on the top carriage and chassis and which prevent skidding of the top carriage during recoil.

COUNTER-RECOIL BUFFERS.—A counter-recoil buffer is fitted to the forward end of each chassis roller path. The buffer cylinder is securely bolted to the chassis, and on the rear face of the cylinder casting a stop is machined, against which a corresponding machined surface on the forward end of the top carriage abuts when the gun is fully in battery.

Each end of the counter-recoil buffer cylinders is closed by a stuffing box fitted with hydraulic packing. Twenty-four rings of packing are furnished for each carriage, five for each stuffing box and four rings for replacements.

Each cylinder is provided with a filling plug located on the top, in front of the piston head in its rear position. A bronze plate, with instructions as to filling the cylinder, is secured by screws near the filling plug.

Two holes extend through the wall of the cylinder from the lowest element of the bore, at an angle of 45 degrees downward. To these openings are coupled the pipes connecting with the buffer valve.

The openings are located longitudinally, one just in front of the rear stuffing box, so that it is always in rear of the piston head; the other 2.125 inches in rear of the front stuffing box.

The piston extends through both stuffing boxes. The piston head, located approximately in the middle of the piston rod, is bronze lined and has a diametral clearance in the bore of 0.002 inch, which fact necessitates the passage of oil from one side of the piston head to the other during rapid movement, principally by way of the buffer valve, and very little directly past the piston head.

On the exterior of the buffer valve, at its forward end, are cast two lateral horizontal lugs, one on each side. Annular projections are formed on their rear faces, centering and supporting the buffer spring covers and buffer springs, which extend to the rear alongside the hydraulic cylinder. In the center of these projections are holes through which the buffer-spring rods pass.

The buffer spring rods, of steel, are both attached at their forward ends to a buffer yoke, of cast steel, which is attached at its middle to the forward end of the buffer piston.

The rear ends of the spring rods are attached to buffer-spring supports, which consist of steel sleeves, inclosing the rods, with flanges at their rear ends fitting easily in the interior of the spring covers and supporting the rear ends of the springs. Collars are machined on the buffer-spring rods which, by seating against the front face of the buffer-cylinder casting, limit the rearward movement of the piston and parts connected to it. A piston movement of 9 inches is provided for.

The action of each counter-recoil buffer is as follows: When the gun is out of battery, the buffer springs, acting against their fixed supports in front, force the spring supports, spring rods, yoke, and piston rod to the rear until stopped by the collars on the spring rods. The buffer piston head in this position is 0.75 inch in front of the rear stuffing box. The rear end of the piston rod projects 9 inches in rear of the stop of the top carriage when in battery.

When the gun rises into battery the top carriage strikes the projecting end of each piston rod and forces it to the front, compressing the buffer springs.

For the first 7.5 inches of piston movement the oil in front of piston, being displaced, passes through the forward opening in the bottom of the bore to the buffer valve and returns to the cylinder through the rear opening. The forward opening is at this point closed by the piston head and for the remaining 1.5 inches of piston movement the cylinder acts as a dash pot, it being possible for oil to escape only around the piston head. Unless the energy of the top carriage, etc., is too great at the end of 7.5 inches of movement, due to the buffer valve not being correctly set, they will be brought to rest against the stops without jar to the carriage.

If for any reason the retracting clutches should fail to retain the gun out of battery after recoil, it is necessary, to prevent jar to the carriage, that the buffer pistons reach their rearward position before the top carriage strikes them, in order that they may do the full amount of work of retardation. The buffer springs have been designed to accomplish this, assuming that the stuffing boxes do not offer an unreasonable frictional resistance. *It is therefore important to screw up the glands only sufficiently to prevent leakage.* From the foregoing description it is evident that it will be necessary to tighten the front stuffing box more than the rear one.

Buffer Valve.—Both counter-recoil buffers are joined to the buffer valve, the different settings of which enable the energy of counter recoil to be absorbed without shock to the carriage under varying conditions affecting the velocity of counter recoil. Aside from mechanical difficulties and those due to differences in the elements of loading, the following sources of variation may be mentioned: Atmospheric temperature, affecting the oil in both recoil and buffer cylinders; specific gravity of this oil (prescribed 0.85), and the loading position.

The equalizing and throttling pipes serve to connect the buffer valve to the buffer cylinders, to equalize the pressure in the buffer cylinders, and to facilitate filling them. Four plugs are furnished to close the buffer cylinders in case these pipes are damaged in action.

The buffer valve is located at the top of the oval opening in the front transom, to which it is attached by two bolts. It is accessible from the front of the carriage.

It consists essentially of a valve body, gland, disc, and handle of bronze, and a stem of steel and bronze.

The body which supports the other parts and provides means for attachment to the front transom has two T-shaped chambers. The horizontal branches are coupled to the equalizing and throttling pipes, the upper leading to the forward ends of the buffer cylinders and the lower to the rear ends. The vertical branches overlap, that of the upper chamber being in front of that of the lower chamber. A horizontal hole extends from the front of the body through the vertical branch of the upper chamber and through the wall between the two branches to the rear chamber. In the hole through the wall between the chambers is screwed a steel valve seat which has a central hole enlarging in the front face into a conical seat for the point of the valve stem. The larger part of the oil displaced in the counter-recoil buffers during counter recoil passes through this hole.

Just in front of the front and upper chamber, the hole is threaded to receive a corresponding threaded portion on the valve stem. So that if the stem be turned clockwise, its conical point will bear on the valve seat and close the valve; if the stem be turned counter-clockwise, the opening about its point will increase and may reach a maximum of about 0.056 square inch.

The disc is fixed to the body concentric with the stem. On the front face is an annular flange with ninety internal teeth, in which three corresponding teeth on the handle engage in order to retain the valve at any desired setting. The teeth on the disc are numbered counter-clockwise from 0 to 80 at intervals of five teeth. A pin set in the face of the disc prevents the handle being turned more than 360 degrees.

The handle is a bar with a rectangular hole in the middle which fits on a corresponding portion of the stem. At one end is a pointer with teeth which engage in the teeth of the disc. An index line on the handle permits accurate setting at any desired tooth. The rectangular portion on the stem is so laid out that the handle engages at 0 of the disc when the valve is closed. The handle can be moved along the stem to permit disengaging the teeth when changing the setting. A padlock is provided in order that the valve setting may not be tampered with by unauthorized persons.

When the carriage has been erected at the fortification and a thorough knowledge obtained of its characteristics in counter recoil, under all conditions, the disc should be stamped, under the direction of the Ordnance Department, at the proper points of the annular space provided for this purpose, with the words "Very hot," "Hot," "Warm," "Medium," "Cool," "Cold," and "Very cold," to facilitate setting the buffer valve.

A stuffing box is formed in the body around the stem, in which four rings of packing are placed.

An emptying plug is located at the bottom of the valve body which serves to drain the buffer cylinders.

The setting of the buffer valve is best determined by trial. The setting of the recoil valve should be considered in setting the buffer valve. With a higher setting of the recoil valve, counter recoil will be more free, and consequently the buffer valve setting should be lower. The following data are given as a rough guide in setting the buffer valve before more definite knowledge has been gained by trial:

Atmospheric temperature F.	Buffer valve setting.
0 to 30	80 to 45
30 to 60	45 to 20
60 to 80	20 to 15

The counter recoil should be regulated by settings of the counter-recoil buffer valve and not by adding or removing counterweight.

GUN LEVERS AND AXLE.—The gun levers support the gun at its trunnions in bronze-bushed bearings at their upper or rear ends; and the crosshead, counterweight, bottom plate, and recoil cylinder in bushed bearings at their lower or forward ends. The arms of the axle pass through the bores in the gun lever, project beyond them, and rest in the bearings of the top carriage.

CROSSHEAD AND COUNTERWEIGHT.—The crosshead is a steel casting which serves to attach the counterweight to the gun levers, and through the guide clips bolted to both sides of it, together with similar clips cast on the bottom plate, constrains the counterweight to move vertically, preserving the alignment of the recoil cylinder.

The gun-lever pins of forged steel are inserted from the inside of the crosshead through the bearings in the gun lever. A key covers a segment of the inner end of each, and is secured at both ends to the face of the bearing in the crosshead, serving to prevent the gun-lever pin from working out of place. A tongue on this key rests in a groove in the gun-lever pin and prevents rotation. Each pin is tapped axially at its inner end to receive the extractor used to withdraw it.

The guide clips are keyed longitudinally to the crosshead, and for the upper 16 inches of their length are secured by bolts pinned and permanently finished in place.

On the rear flange of each guide clip is machined a rack in which the retracting pinions engage.

There is a finished hole in the center of the crosshead in which the upper end of the recoil cylinder fits closely for alignment.

In each corner of the crosshead are bored vertical holes through which the four suspension rods depend. These rods are secured to the crosshead by castellated nuts with split pins which draw the shoulders on the rods firmly against the finished under surface of the crosshead. In a similar manner there is attached to the lower ends of the rods the bottom plate, on which rests the counterweight, and to which is attached the recoil cylinder.

Guide clips are cast on the bottom plate which correspond to those attached to the crosshead.

On the bottom plate is piled the counterweight, consisting of eleven cast-iron weights; six are about 4,000 pounds each, forming the first six layers. The seventh layer consists of three weights, a total of about 2,000 pounds, the inner placed under the crosshead with an outline and upper surface corresponding to the rods on the crosshead, and two outer ones held in place by T slots, which engage over similar projections cast on the front and rear sides of the crosshead. The eighth layer of about 1,500 pounds consists of two weights in front and rear of the crosshead of the same shape as the outer weights of the seventh layer and held in place by projections on the bottom, which seat in depressions on the upper surface of the weights below.

The eighth layer and the outer weights of the seventh layer can be removed without disturbing the crosshead, the others can not.

It is not intended that counterweight should be removed or added to regulate counter recoil, and none is provided for this purpose.

The total weight attached to the gun levers, including crosshead, counterweight, bottom plate, and recoil cylinder filled with oil, is about 35,000 pounds. The counterweight alone is approximately 27,000 pounds. The preponderance of the weight of the counterweight, etc., over the weight of the gun is approximately 15,000 pounds.

Recoil System (Plate V).—The energy of recoil is absorbed principally by a single vertical hydraulic cylinder moving with the counterweight and a piston and rod secured at its lower end to the middle of the piston-rod beam.

Recoil is varied to meet varying conditions of atmospheric temperature, velocity of projectile, etc., by means of a recoil valve contained in the piston rod.

The principal parts of the recoil system are: The recoil cylinder, the upper and lower cylinder heads with stuffing boxes, drain plug, filling plug, piston and rod, valve stem and body, locking disc, hasp and hasp bracket, piston rod bracket, and recoil indicators.

The recoil cylinder has two throttling grooves cut on its interior at opposite ends of a diameter. These grooves are of variable cross section in order to oppose a constant resistance to the energy of recoil of the carriage. The two ends of the cylinder are closed by the upper and lower cylinder heads.

Narrow copper gaskets $\frac{1}{16}$ inch thick, seated in recesses at both ends of the cylinder, are compressed in securing the cylinder heads, sealing the joints against oil pressure.

Around the bore of each cylinder head a stuffing box prevents the escape of oil by the piston rod. Each stuffing box requires 6 rings of hydraulic packing 0.5 by 0.5 inch square. Eighteen rings are issued with each carriage, 6 being for reserve.

In the lower cylinder head is a recess 5.25 inches in diameter. On the piston below the head is a corresponding enlargement which enters this recess with slight clearance. If at the end of recoil the energy has not been normally absorbed, these parts, acting as a dash pot, provide a safeguard against possible injury to the carriage.

The filling and drain holes are in the upper and lower cylinder heads respectively. The filling plug is in the form of a tap bolt; one additional is supplied. The drain plug is so arranged that the oil can be withdrawn from the cylinder without unscrewing the plug more than a few turns. A brass gutter is bolted to the piston rod beam under the plug for the purpose of conducting the oil within reach of the receptacle.

The piston and rod are of forged steel in two pieces, the lower part of the rod being formed in one piece with the piston. The lower end passes through a hole in the piston-rod beam. Two nuts engage on threaded portions of the rod above and below the beam, cylindrical portions on them seating in counterbores in the beam, thus aligning the rod. The upper nut is secured by a taper pin; the lower is castellated and secured by a split pin.

The upper end of the rod is bored axially to receive the stem and body of the recoil valve. At the piston two grooves surround the bore. Four holes radiate from each of these grooves, one set opening on each side of the piston. Oil can therefore pass from one side of the piston to the other in two ways; namely, by the outside of the piston head, through the diametral clearance of 0.02 inch and the throttling grooves, and through the two sets of radial holes.

Passage through the radial holes is restricted by the recoil valve body. This is a bronze bar fitting closely in the piston rod bore, opposite the piston. It has a diametral slot 0.4 inch wide, 1.625 inches long, and 1.375 inches from the lower end. With the recoil valve open this slot reaches from one groove to the other. As the valve body is withdrawn upward the portion of the slot open to the lower groove decreases to zero, when the passage between the two sets of radial holes is closed.

At the upper end of the piston a bronze valve stem nut is screwed into the bore and secured by a nut-locking screw. A slot in the upper end of this nut affords means of removing and inserting it with the tit wrench provided for this purpose.

The valve stem is a steel rod connecting the valve body with the valve stem nut for the purpose of actuating the former. The upper end of the valve stem has a flatted portion over which the locking disc is seated and on which the wrench for the recoil valve engages. This wrench is provided on one end of the tit wrench for the valve stem nut. In order to remove the valve, the valve stem nut must be taken out.

The locking disc is of steel, 3.5 inches in diameter, and has 11 notches on its circumference to indicate the open, closed, and nine intermediate positions of the recoil valve. These notches are numbered from 0 to 10, inclusive.

When the shoulder on the valve stem stops against the lower end of the valve stem nut, the 0 notch is toward the front of the carriage and opposite the hasp, and the bottom of the slot in the valve stem body is 0.25 inch above the lower groove in the piston-rod bore. When the disc is turned clockwise 90 degrees, the valve stem descends 0.25 inch and brings the bottom of the slot to coincidence with the upper edge of the lower groove. A further movement of 18 degrees uncovers the lower groove 0.05 inch or an area of 0.02 square inch and brings the first notch of the locking disc opposite the hasp. Similarly each additional notch opens the passage through the piston 0.05 inch. When the tenth notch is opposite the hasp, the lower groove is uncovered 0.5 inch, and the valve is open.

The upper end of the piston rod is flatted to retain it in a fixed position with respect to rotation. A piston rod bracket of cast steel maintains the upper end of the piston rod in alignment. The hasp bracket is bolted to the piston rod bracket in front of the piston rod, seating against the flatted portion on the latter. The hasp, by engaging in notches on the locking disc, retains the recoil valve at any desired setting. A flange on the top of it prevents the locking disc from moving vertically when the hasp is engaged. A slot in the hasp passes over a lug on the hasp bracket, after which a padlock is secured to the lug preventing any unauthorized change in the setting of the recoil valve.

A filling plug instruction plate is secured to the crosshead near the filling plug, so as to be visible from the front of the carriage.

The normal recoil is **47.8** inches; 2.7 inches additional recoil is provided for. During this additional recoil, the recoil buffer previously described would act to bring the carriage to rest without shock. An indicator to measure the recoil is secured to the inside of each chassis so as to be visible through oval openings in front of the chassis. Numbered graduations are cast on it at intervals of 1 inch. Pointers are attached to the front surface of the guide clips.

The recoil valve is the only means provided for varying the length of recoil, *and no attempt should be made to use other means for this purpose. Although the setting of the recoil valve slightly affects counter-recoil, it should not be used to regulate the latter movement.*

When more definite data are not available, the valve setting for the first round at full charge should be:

Atmospheric temperature.	Recoil-valve setting.
Below 30° F.	9
30 to 70° F.	8
Above 70° F.	7

A careful record should be kept of recoil-valve settings for each carriage, in a form convenient for their study for guidance in future firings.

For firings with all charges, the recoil cylinder should be filled to the level of the filling hole with the oil issued for this purpose, and frequent inspections should be made of the lower stuffing box during firing to guard against leakage of oil. If escape of oil occurs, the cylinder should be refilled and the cause of leakage remedied.

RETRACTING GEAR (Plate VI).—The retracting system enables the gun to be retracted from the firing to the loading position when desired. The effort required is the greatest at the start and steadily diminishes.

Retraction is by hand power only. Power is applied to cranks on each side of the carriage. The extremities of the shaft on which the cranks engage are square, and the cranks are secured by **split pins**, making them easily removable. Power applied to the cranks is transmitted through trains of gearing on each side of the carriage to pinions engaging in the racks on the guides. These pinions are connected with the remainder of the gearing by retracting clutches and are free to revolve on their supporting shafts when the clutches are disengaged. This makes tripping of the carriage possible.

The retracting-crank shaft is supported in each chassis. Two steel retracting crank-shaft spur pinions are keyed to the shaft inside of the chassis. They engage in retracting intermediate gears which are keyed to the retracting intermediate shaft. This shaft is supported in brackets bolted to the inside of the chassis. Two bevel pinions are also keyed to the intermediate shaft, engaging in bevel gears which are keyed to the retracting-clutch shafts. The latter are supported in three bearings in each chassis parallel to it. Between the two forward bearings of each shaft is a retracting clutch, clutch sleeve, and clutch pinion.

The retracting-clutch sleeve is secured to its shaft by twelve slots on its interior, which have a drive fit over corresponding feathers machined on the shaft. It is surrounded by a clutch of steel, which also has twelve slots on its interior, having a sliding fit over corresponding feathers on the exterior of the sleeve. Six helical springs seated in the retracting clutch parallel to its axis act through plungers against the flange on the rear of the retracting-clutch sleeve and urge the retracting clutch forward. The retracting-clutch pinion is of forged steel bronze bushed, and has twelve teeth which engage in a rack on the guide. Forty-eight radial teeth on its rear face engage in similar teeth on the front face of the retracting-clutch sleeve. They are of triangular profile, one face of each tooth being in an axial plane.

Openings in the chassis are provided opposite the retracting clutches and also opposite the retracting bevel gears. Cast-iron covers surround the engaging teeth of the retracting clutches. Guards also protect the portions of the bevel gears which project through the chassis.

When the counterweight rises, the clutch teeth, due to their shape, ride over each other, permitting independent rotation of the retracting pinion. When the counterweight starts to descend the teeth engage and the effort is transmitted through the retracting gearing to a ratchet wheel located inside of the left chassis on the retracting crank shaft. A lever is provided for the purpose of disengaging the pawl from the ratchet wheel when desired.

The retracting cranks should be removed and placed on the chassis hooks provided for them when they are not actually in use.

Bearings of the shafts of the retracting gearing are provided with roller bearings. Longitudinal motion is in general prevented by thrust collars pinned to the shaft and having grooves filled with felt, which protects the roller bearings from dust. Ample means for lubrication are provided, *and it is important that parts of the retracting gearing be kept well lubricated.*

TRIPPING GEAR (Plate VI).—Tripping gear, including the safety latches and their pawls, is for the purpose of releasing the retracting clutches against the action of their springs and allowing the gun to rise into battery; of automatically holding the clutches released while the counterweight is descending; and of automatically releasing the clutches and permitting them to reengage when the gun is fired.

Tripping gear in this carriage consists of the following principal parts: Tripping lever and shafts; tripping rods and cranks; retracting-clutch levers with pins and studs; safety latches; safety-latch handle and safety-latch pawls.

The tripping lever is located outside of the rear end of the left chassis and is keyed at one extremity to the tripping-lever shaft. This extends across the carriage and rests in bronze bushed bearings in each chassis. Vertical rotation upward of the tripping lever is limited by a stop screwed in the rear flange of the chassis. Downward rotation of the tripping lever is stopped by a notch in the edge of the upper surface of the racer.

The retracting-clutch levers are pivoted at the upper end of the chassis above the retracting clutches. Each lever encircles the retracting clutch, and studs inserted through each side of the lever engage in a groove on the exterior of the clutch at extremities of a horizontal diameter. The tripping rods connect the lower extremities of the clutch levers to cranks keyed to the tripping-lever shaft inside of each chassis.

The safety-latch shaft extends across the carriage and rests in bronze bushed bearings in each chassis. A safety latch is keyed at its rear end to the safety-latch shaft inside of each chassis. At the forward end of each safety latch, on the underside, is a projection which, due to the weight of the latch, engages over a corresponding projection on the clutch lever when the latter has been drawn sufficiently far to the rear to release the retracting clutch.

Lugs on each side of the crosshead in rear of the guide clips contain recess for safety-latch pawls. Each of these pawls, actuated by a flat spring, presents to the exterior of the crosshead a triangular portion which is placed so as to strike the forward extremity of the safety latch. The shape of the pawl is such that when it approaches the latch from below it raises the latter until it is out of engagement. This movement of the latch is sufficient to disengage it from the retracting-clutch lever. If the pawl approaches the latch from above, the former is rotated into its recess and thus passes the latch. The action of the tripping gear is as follows: When the tripping lever is raised to its limit of upward movement, the clutch levers are rotated to the rear, carrying the retracting clutches with them, freeing the retracting-clutch pinions and the counterweight. The safety latches, shortly after the clutches are released, engage on the lugs of the clutch levers, preventing reengagement of the clutches, and also preventing the tripping lever from falling into its original position. The fact that the tripping lever does not return serves to readily indicate the engagement of the safety latches.

The seriousness of the safety latches not engaging, which will permit the retracting clutches to reengage during counter recoil, is apparent. *Great care should be taken to raise the tripping lever to its full limit of upward movement in order that the safety latches may engage. Before releasing the hold on the tripping lever, a slight downward pressure on it will show whether or not the latches have engaged.*

After tripping the carriage for the first time in the day and before firing or retracting, the clutches should be observed to be free on their sleeves, manipulating the tripping and latch levers several times for this purpose.

After counter recoil the safety-latch handle may be raised, releasing the latches, and the tripping lever lowered to its original position. Or if the gun be fired with the safety latches engaged, the safety-latch pawls approaching the latches from below will automatically release them and the tripping lever will fall. The safety-latch handle must be raised, releasing the latches and retracting clutches, before the gun can be retracted. The tripping lever should be habitually in its lowest position.

The parts of the tripping gear connecting the tripping lever with the retracting clutches are not designed to support weight, and should not be used as a foothold by one passing over the interior of the carriage. **Where required a padlock and chain are provided for locking the tripping lever.**

THE ELEVATING SYSTEM (Plate VII).—The gun is moved in elevation by turning an elevating handwheel, which is connected through its shaft and bevel gears to a screw fixed to the rear transom. A moving nut on the screw is connected with the lower end of the elevating arm, whose upper end is attached to the gun 66 inches in rear of the trunnion. A slow-motion handwheel is also provided for setting the gun accurately at any desired elevation. For the same movement in elevation, the slow-motion handwheel makes about six turns to one of the elevating handwheel.

The elevating system consists of the elevating band and arms, slide, slide nut, slide spring, screw, shaft gears, shaft, handwheel; also the elevation and range scale and pointer, the counterbalance device, and the slow-motion gearing.

The elevating band seats in a groove in the gun. On the extremities of a horizontal diameter are band trunnions which are inserted after the elevating arm is in position.

The elevating arm is connected at its lower end to the elevating slide, by means of the elevating pin, which is inserted through bronze bushed bearings in the slide and through a hole in the elevating rod; at its upper end it is connected to the elevating band.

The elevating slide consists of two side pieces connected by transoms. Along the lower edges are bronze-lined flanges. In the rear transom are planed guideways for these flanges. The slide is held in place by cast-steel gibs bolted to the rear transom. To the side of the right guideway is bolted the elevating stop.

Due to the severe downward shock received through the elevating arm when the gun is fired, the thrust is transmitted from the elevating slide to the slide nut by a helical spring surrounding the slide nut. It is compressed between the flange on the lower end of the nut and the upper transom of the elevating slide. In order that the elevating slide and slide nut shall have the same relative position at all times, except when the spring is compressed by firing, a spring-compressing nut is screwed into the lower transom of the slide, with its upper end bearing on the bottom of the slide nut. The spring-compressing nut is set up so as to give the spring an initial compression, which will positively return the compressing nut to a bearing against the slide nut after the spring is compressed by firing. This initial compression is given during the shop test of the carriage, and a taper pin is inserted in the elevating slide through a hole in the flange on the head of the compressing nut. *In case the nut should later be removed, care must be exercised that it be returned to exactly its original position, as the 0 of the elevation scale will otherwise be thrown out of adjustment.*

The elevating shaft is located at the rear and left side of the carriage. It rests in three roller bearings, one in the left chassis and two in lugs cast on the middle of the top of the rear transom. To the outer extremity is keyed the elevating handwheel shaft of wrought iron with cast-iron hub. Between the two inner bearings of the shaft is keyed a forged steel elevating shaft bevel pinion engaging in the gear on the elevating screw.

The elevation and range scale and pointer is for the purpose of indicating the elevation of the gun, both in degrees and yards of range, for a given weight of projectile and muzzle velocity. It consists principally of a base, cover, slide, **service and subcaliber range scales, and dog.**

The base is of cast iron with six lugs on the under side by which it is bolted to bosses on the rear transom. Its length is parallel to the guide ways in the rear transom, but its surface is inclined so as to be visible to one standing at the elevating handwheel. The cover is of the same form as the base and is secured to it by eleven tap bolts. A longitudinal groove in its under surface accommodates the bronze slide, together with the range scales screwed to it. A lug cast on the inner side of the slide projects below the base through a slot between it and the cover. The elevation and range scale are of German silver **screwed** to the upper surface of the slide, **subcaliber** scale on the right.

The dog is bolted to the left side of the elevating slide and extends to the left, so as to be clamped between two adjusting screws on the lug of the slide. This causes the slide and elevation slide to move as one and provides a means of adjusting the scale to read 0 when the gun is at 0. The range scales are visible through an opening in the cover. German silver index plates marked "0" are set in the cover on each side of the opening, at which the readings of the scales are taken. **Degrees of elevation are marked by transverse lines along the right edge of the service range scale. They are graduated to a least reading of 5° elevation, 4° depression for all carriages except Nos. 18 and 19 and 5° depression for carriages Nos. 18 and 19. The service and subcaliber range scales are similarly graduated to a least reading of 50 yards. The opening in the cover is provided with a pointer lid.**

The counterbalance device tends to equalize the force required for elevating and depressing, with the gun in the loading as well as in the firing position. A cast-iron cylindrical weight of 580 pounds is suspended by means of an equalizing bar fork extending through it axially from the equalizing bar. To the extremities of the latter are attached the ends of the rope. Its bight passes over two pairs of guide sheaves to the upper end of the guide ways of the rear transom, thence to the lower end of the elevating slide nut, to which it is secured by two clamps bolted to the slide nut.

The weight descends vertically into the counterweight well as the gun is depressed.

The slow-motion elevating gearing is located at the rear end of the left chassis.

It consists of handwheel, shaft, and bevel gears; connecting shaft and bevel gears; clutch, clutch fork; shifter, rod, and shifter-rod handle; together with the necessary bearings.

The slow-motion elevating handwheel is connected by shaft and bevel gears to the elevating shaft. Just above the bearing for the slow-motion handwheel shaft on the rear of the left chassis is a lever which operates a clutch for throwing the slow-motion elevating device either in or out of gear with the elevating shaft. When the gun is being elevated by the elevating handwheel it is immaterial whether the clutch is so thrown that the slow-motion handwheel revolves or not.

All gears of the elevating system are provided with cast-iron gear covers in halves bolted together. Oil plugs in them provide easy means of oiling the gears. Roller and other bearings are also provided with ample means of lubrication.

Traversing System (Plate VIII).—The traversing system enables the racer and parts supported by it to be easily and quickly moved in azimuth on the traversing rollers, either from the working platform or from the sighting platform.

Traversing is accomplished by rotation of the traversing pinion, which is attached to a vertical shaft at the rear of the carriage, and engages in a steel rack fixed to the interior of the base ring.

The traversing system consists principally of gearing for rapid movement from the working platform at the right side of the carriage, and of slow-motion gearing for smooth slow movement, as in following a target. It is composed of traversing rack, pinion, pinion shaft, crank shaft, and gears.

The traversing rack is of six sections joined in such a manner that they can be easily removed individually, and secured to the base ring by sixty screws set below the surface of the bottom of the teeth. Traversing pinion is keyed and secured by a castellated nut to the traversing pinion shaft. The latter has two roller bearings and one ball thrust bearing in the rear clip and traversing bracket, which is a steel casting bolted to the rear transom and to the racer. It also provides two roller bearings for the traversing crank shaft, to which is keyed a forged steel traversing crank shaft bevel pinion, which engages in a cast-iron gear keyed and secured by castellated nut to the upper end of the traversing pinion shaft. A traversing crank is secured by a split pin to the right extremity of the crank shaft outside of the chassis. The traversing crank is easily removable, and hooks for it when not in use are provided on the chassis.

The slow-motion traversing gearing (Plate VIII) consists essentially of a handwheel, shaft, and gears; intermediate shaft; clutch gears, plunger, rod, fork, and fork lever; foot lever; spring stirrup and spring, and the necessary bearings. The handwheel is attached to the rear end of its shaft which is connected to the traversing intermediate shaft. The intermediate shaft is keyed to a bevel gear, which engages in a pinion secured to the forward end of the handwheel shaft. The lower end of the intermediate shaft is supported in the cast-iron intermediate shaft bearing (lower), which is bolted to the left chassis at the traversing-crank shaft. There is keyed to its lower extremity a forged steel clutch bevel pinion. The cast-iron gear in which it engages is bronze bushed and is free to rotate on the traversing-crank shaft. The traversing clutch is a steel collar having a sliding fit over two keys on the crank shaft to the left and outside of the clutch gear. Three 60-degree lugs on its right end engage between corresponding ones on the left end of the hub of the gear.

The clutch mechanism is for the purpose of moving the clutch in and out of engagement with the clutch gear. When engaged, the rotation from the sighting platform of the clutch gear is transmitted to the crank shaft and traversing pinion; when disengaged the crank shaft can be rotated in the bushing of the clutch gear without movement of the slow-motion gearing. It is operated from the sighting platform by pressure of the foot on a plunger which actuates a series of levers, moving the clutch into engagement; releasing the foot pressure causes the disengagement under the action of the clutch-rod spring, which returns the plunger to its original position.

All gears of the traversing system are provided with gear covers. Oil holes are provided for lubrication.

Sighting Platform.—One sighting platform is provided on the left-hand side of the carriage. Means for traversing only are provided by a handwheel operated from the platform.

Sight.—The sight with which the carriages are equipped is the 3-inch telescopic sight, model of 1904, which, together with its cradle and sight arm, is described in Form 1955. The sight arm is mounted on a sight-arm bracket, which is in turn mounted on the upper end of the sight standard.

The sight standard is of cast steel. The upper end of the sight standard is turned to a diameter of 6.497 inches for a height of 6 inches, below which is a flange with two set screws in front screwed into lugs 2.5 inches apart. The sight-arm bracket is of cast steel with a socket at the rear bored to fit the upper end of the sight standard. An arm projects to the front 25.44 inches, having at the extremity a double bearing for the sight-arm bracket pin which passes through the hole in the forward end of the sight arm. A lug at the base of the sight-arm bracket is engaged by the set screws of the sight standard, which enables the line of sight to be brought into exact parallelism with the bore of the gun with respect to azimuth. To make the adjustment point the gun at a distant object (about 6,000 yards away, if practicable) by means of a bore sight, set the deflection scale of the telescopic sight at 0, then bring the sight on the target by means of the set screws. Four tap bolts are screwed into the sight standard through holes in the flange at the base of the sight-arm bracket. These holes are 0.188 inch in diameter larger than the bolts, which allows sufficient play to make the desired adjustment, after which the screws should be tightened and the adjustment verified.

Two lugs project upward from the rear of the sight-arm bracket and afford a double bearing for a second sight-arm bracket pin passing through the sight arm. In this case the cradle movement in elevation is merely for the purpose of bringing the target into the field of the telescope.

LIGHTING APPARATUS (Pl. IX).—Plate IX shows the plan of the electrical equipment and the wiring diagram.

The power for lighting is obtained from the power mains of the emplacement through lead-covered cables which enter a terminal box at the rear of the pit. From that point it is distributed by insulated wires with flexible metallic and insulated wrought-iron pipe conduits to **four** 8-candlepower lamps, one at the azimuth pointer, one at the elevation pointer, **one at the recoil valve, and one at the buffer valve,** to three 16-candlepower lamps, one on each chassis and one at the center of the carriage; to one portable 16-candlepower lamp at the **rear of the right chassis**; and to two 2-candlepower lamps on the telescopic sight. The 2-candlepower lamps are for the illumination of the cross wires, and the deflection scale, and range drum. All lamps are 110 volts, in parallel. Where emplacements are equipped with power at 220 volts, lamps are placed in parallel series of two lamps each.

The azimuth and elevation pointer lamps, as well as those for illuminating the sights, are controlled by a single water-tight switch on the lamp fitting of the elevation pointer lamp at the rear of the carriage. The chassis lamps, the lamp at the center of the carriage, the recoil and buffer valve lamps, and the deflection scale and cross-wire lamps are controlled by a Russell switch located on the outside of the left chassis. The cross wires of the sight are provided with a mechanical dimmer by which the lamp is occulted to any desired degree.

The portable lamp and cable is hung on a hook provided for that purpose on the base of the sight standard; the plug box being directly above the hook. The handle and shade are of alluminum and made in one piece; the shade protecting the lamp and serving as a reflector.

Firing Apparatus.—The gun may be fired either electrically or by lanyard. The current for firing the gun electrically is obtained from a firing magneto mounted near the top of the sight standard.

The magneto is inclosed in a bronze case and is provided with high-ratio gearing and a lever for operating. It is not necessary to raise the lever violently, as a slow motion is sufficient to fire the primer. One pull of the lever should be sufficient, when the magneto is working properly. A clutch is provided on the intermediate shaft, making it possible to move the lever back into its normal position without reversing the armature shaft. The lever is held in its lowest position by a catch when not in use. For further information see Form No. 1814.

The firing cable should never be used as a handhold, as a great deal of trouble with firing circuits has been due to this cause.

Alcohol or gasoline should be readily available for cleaning the contacts of all electrical connections.

A circuit breaker on the breech of the gun prevents the possible firing of the gun electrically except when the breechblock is fully closed, whether the gun be in the loading or in the firing position. A safety firing switch on the carriage prevents the possible firing of the gun electrically, except when fully into battery or nearly so. This device consists of a double-pole single-throw switch, the parts of which are separated by the recoil, one part being attached to the chassis, the other part to the top carriage. The part attached to the chassis is so arranged that when the top carriage recoils it drops out of position, so that on counter recoil contact is not made until this part is raised into position by a lever on the outside of the left chassis.

The gun is fired by lanyard from the loading platform. A safety device has been added to prevent the possible firing of the gun by lanyard except when fully in battery or nearly so. The device consists of a short lanyard running from the primer to a ring at the end of a **linen cord** wound on a reel. The reel is carried in a housing attached to the rear face of the elevating band on the gun. One end of the firing lanyard is attached to the ring on the **linen cord** the other is held by the cannoneer who is to fire the piece. The short lanyard can be pulled to the rear so as to fire the primer only by first unwinding the **linen cord** from the drum. This is prevented while the gun is from battery by the action of a pawl which engages a ratchet on the drum. When the gun rises into battery, this pawl is automatically tripped by a cam attached to the rear face of the elevating arm. **The pawl should be kept clean and oiled to prevent rust and to insure its proper functioning.** This permits the reel to be unwound and the pull to thus come upon the short lanyard attached to the primer.

The reel is provided with a spiral spring which causes it to rotate and wind up the copper cable as soon as the pull upon the lanyard is released. The initial tension of this spring should be such as to cause the copper cable to be wound up with certainty with the lanyard attached. Should the initial tension be much in excess of the proper amount, the spring may become wound solid before sufficient cable has been unwound to permit the firing of the primer. Too much tension on the spring is otherwise objectionable, since it brings unnecessary strains on the parts when the reel automatically winds up.

Should the tension of the spring require adjustment, it may be done as follows: Loosen the nut on the spring shaft projecting from the center of the case; hold with a screw wrench the square end of the shaft to prevent the spring from unwinding; remove the spring shaft pin, and, by means of the wrench, turn the spring shaft in such direction as to increase or decrease the tension as required. Holes are provided wherein the pin may be inserted at any quarter turn of the shaft.

A safety device on the firing mechanism proper prevents possible firing of the primer by lanyard until the breechblock is locked, whether the gun be in the loading or in the firing position.

Shot Trucks.—Four shot trucks are furnished with each carriage for bringing projectiles to the gun. Each truck carries six projectiles. They are to be taken from the truck and inserted in the gun by hand. All shot-truck wheels are equipped with rubber tires, set in grooves on the wheels and vulcanized in position.

Shot Tongs.—Each carriage is provided with seven pairs of shot tongs for handling the projectiles in the emplacements. In order to provide tongs having a small height over all, and thus to increase the amount of possible hoist in the galleries of the emplacement, the tongs are designed with a lock which must be operated by hand before they will grip a projectile. This lock consists of a dog, the inner end of which presses against the top of the projectile while the outer side is held by a U-shaped piece rotated into position after the tongs have been placed on the projectile.

Grease Cups.—Eight grease cups are provided for lubricating the heavy bearings of the gun levers and the rear bearing surfaces of the vertical guides, with the heavy grease necessary for this purpose. The grease cup consists essentially of a body for carrying the grease and a cap carrying a piston actuated by a coiled spring. When the cap is screwed down over the body of the cup, the piston bears against the grease. By further movement of the cap the spring in rear of the piston is compressed, thus putting a sustained pressure on the grease. *This cap should habitually be kept screwed down so as to maintain a clearance of about 0.25 inch between its face and the face of the nut on the projecting piston*, affording a visible indication that the grease is being forced into the bearing.

Implements.—Each carriage is equipped with the wrenches, screwdrivers, lifting hooks, pinch bars, and oil cans required for its mounting and care. These parts, except those too large, are stored in an armament chest, together with the necessary implements for the gun.

INSTRUCTIONS FOR ASSEMBLING THE CARRIAGE.

General Remarks.—The carriage is dismounted for shipment, the heavy parts being separated, the finished surfaces slushed and covered with boards. The chassis and transoms are sometimes shipped assembled. The small parts are disassembled sufficiently for boxing them conveniently. Except where impracticable on account of the size or other characteristics, each part bears a piece mark shown on the drawing near the designation of the part. The first number of this piece mark indicates the drawing on which the part is detailed. Where it is possible to assemble the parts in more than one way, they are sometimes marked to indicate the way in which they were assembled during shop test—as, for instance, the two ends of two distance ring sections which adjoin are marked with the same number. The shipping list itemizes the contents of each box.

The following approximate weights are given as a guide in assembling and handling the parts.

Part.	Weight.
	Pounds.
Base ring with traversing rack	8,000
Distance ring, four sections, without rollers	1,000
Racer	6,000
Chassis	6,000
Front transom	925
Rear transom	2,200
Guide frame, each	1,000
Piston-rod beam	750
Vertical guide, each	600
Guide bracket, each	650
Sight standard	1,050
Top carriage	2,600
One roller cage with rollers	350
Bottom plate	3,300
Counterweight, largest piece	4,200
Recoil cylinder with cylinder heads	970
Piston rod	350
Crosshead, with guide clips	3,200
Sighting platform	550
Elevating arm	650
Elevating band	320
Gun levers, axle, yoke, etc	6,400
Counter-recoil buffer, assembled	350
Gears, shafts, brackets, cranks, and other parts not mentioned above, about	7,500
Total weight (unboxed) about	92,000

In assembling the carriage no part should be directly struck with a steel hammer or sledge. A wooden buffer should be used on the part to be struck, or soft-metal drifts or hammers should be used. In *handling parts, care must be exercised that machined surfaces do not become burred. All bearing surfaces should be clean, smooth, and well lubricated prior to being brought together.*

The assembling of the carriage requires the use of such blocking, way plank, hydraulic jacks, ropes, and pulleys as are usually found at seacoast forts. In addition to these a derrick or shears capable of safely lifting 4 or 5 tons will be found very useful.

INSTRUCTIONS FOR ASSEMBLING.—Carriages should be mounted under the immediate supervision of an ordnance machinist familiar with the work, so that the following instructions are intended to be general only.

BASE RING.—Move the base ring into position over the pit by means of the derrick or by skids and rollers, placing the part marked "Front" in the axis of the emplacement. Place a thrust plate on each holding-down bolt in such position as to receive the thrust from the leveling screws. Clean and oil the threads of the holding-down bolts, then lower the base ring, exercising great care not to burr these threads.

The base ring should be supported by the leveling screws so as to leave an opening underneath sufficiently wide for satisfactory grouting.

LEVELING.—The base ring should be carefully leveled by means of an accurate straightedge and a well-adjusted machinist's level. The straightedge should be used on the roller path by resting it on the inner edge with no blocks or other supports. The level should be reversed in every position and the mean position of the bubble taken as the correct one.

Preliminary leveling may be done from the azimuth circle by supporting one end of the straightedge on blocking in the center of the pit, but the final adjustment should be verified by readings taken on the roller path as described above. At the conclusion of the leveling, moderately tighten all holding-down bolts, verify the level, then add a grouting of neat Portland cement. Care must be exercised that this completely fills the entire space under the base ring. No weight should be added to the base ring until the grouting has thoroughly set. The leveling screws should then be backed off two turns.

DISTANCE RING AND TRAVERSING ROLLERS.—Carefully clean all parts, assemble the rollers in their bearings with the distance ring in place, and run the system around by hand to see that all parts operate freely.

RACER.—Move the racer into position, clean the roller path and pintle surface, then carefully lower into position on the traversing rollers. Care should be exercised not to injuriously rub or cramp the pintle surfaces during the lowering. Assemble the outer and inner dust guards and the covers for openings in racer in order to prevent the possible entrance of dirt or metal chips. The racer should then be run around by hand to determine whether it be entirely free in its operation.

FRONT CLIPS may now be bolted in place.

CHASSIS AND GUIDE FRAMES.—Place either chassis in position, dowel, key, and bolt it to the racer. The rear of the racer may be identified by its being beveled for the rear transom. Lower its guide frame into position and bolt it to the under side of the chassis. Proceed similarly for the other chassis and its guide frame.

PISTON-ROD BEAM should then be attached to the lower ends of the guide frames.

VERTICAL GUIDES are then added.

THE FRONT AND REAR TRANSOMS are bolted in place.

BOTTOM PLATE.—Place blocking in the counterweight well to within 18 inches of the base ring, being careful to leave the center of the bottom plate uncovered as well as the holes for the four suspension rods. The bottom plate should be laid on this blocking, the clips on it engaging the vertical guides. It should be carefully leveled to prevent distortion of the bronze gibs.

RECOIL CYLINDER, with the lower cylinder head, should be placed on the bottom plate and secured to it.

COUNTERWEIGHT is then piled and the suspension rods inserted and secured to the bottom plate.

CROSSHEAD is then added from above. If the upper end of the recoil cylinder is found not to be exactly in position with respect to its bore in the crosshead, the bottom plate should be tipped slightly as necessary by means of jacks applied to its under side.

RETRACTING AND TRIPPING GEAR.—The retracting gear is marked to indicate the teeth which are to be engaged in assembling, so that the whole will function properly when assembled. After the retracting and tripping gear is in place, it should be tested by raising and lowering the crosshead with it for a short distance. The clutches should not be tripped with the crosshead suspended and the latter allowed to drop on the counterweight. The fact should be verified that the clutches engage simultaneously when released. After the retracting and tripping gearing has been assembled satisfactorily, the crosshead may be attached to the counterweight by means of the suspension rods. No attempt should be made to lift the counterweight with the retracting gear before the gun is in place.

PISTON ROD AND UPPER CYLINDER HEAD are then placed.

COUNTER-RECOIL BUFFERS AND ROLLER CAGES should now be added, the latter being placed against the stops with the gears engaged.

Top Carriage should be lowered into its forward position from above so that the gears will all engage properly.

Gun Levers are then added, the top carriage being run rearward for this purpose, and the lower ends secured to the crosshead by the gun-lever pins.

The Gun with Elevating Band attached is then put in place.

The remaining parts of the carriage may now be assembled as convenient, including the elevating arm, slide, etc.; guide brackets, sight standard, piston-rod brackets, elevating and traversing gearing, sight platform, sights, electrical equipment, recoil and buffer valves.

After the gun and elevating arm are in place, the gun may be retracted slightly, freeing the blocking under the counterweight, the blocking removed, and the carriage run slowly into battery by means of the retracting cranks. This will permit the attaching of those parts which require the gun to be in battery.

Important Points.—After the carriage has been completely assembled and the gun mounted, the recoil and buffer cylinders filled, and the valves set as indicated in the description of the carriage, the following points should be noted, namely:

1. Traverse the carriage to the extreme position in both directions to see that it moves freely and that traversing stops are properly located.
2. Elevate and depress the gun to the extreme limits to see that the parts operate freely and that the depression stop is properly located.
3. Retract the gun while in its extreme positions against the azimuth stops to determine whether there be any interferences for recoil in such positions.
4. Examine and clean out all oil holes, noting that they have oil plugs.
5. See that there is not a hard bearing between the rimbases of the gun and gun levers.
6. See that the elevating arm and band are properly assembled, the clearances on each side being the same, and the arms not sprung or twisted.
7. See that the chassis rails and guide clips have not been burred.
8. See that the dust guard does not bear against the distance rings or racer.
9. Adjust the buffer valve until the gun rises as promptly as possible into battery without striking the stops with force.
10. See that the clutches engage simultaneously and that the retracting gearing, tripping gearing, and the safety latches function properly.
11. Set the elevation pointer by the use of a clinometer supported by a rest in the muzzle of the gun, dowel pin it in position, and verify the graduation.

12. Orient the gun, add numbers to the degree marks on the azimuth circle, adjust azimuth pointer to indicate correct azimuth, and dowel pin it in position. Muzzle at true south is 0 degrees in azimuth and numbers are placed around clockwise to include 359.

13. Adjust the sight-arm brackets by means of the set screws, so that the telescope will be parallel to the bore of the gun, as described previously in connection with the sight.

14. See that the electrical connections have been properly made, by trying the lights and firing the primer.

CARE OF CARRIAGE.

General Instructions.—Carriages should be traversed from time to time throughout their entire allowed movement. They should not be allowed to stand for long periods at a particular azimuth, as this might cause uneven settling of the platform.

The habitual position of guns on disappearing carriages is "from battery," but at intervals the gun should be allowed to rise to the firing position and be elevated and depressed within the limits of the stops.

It is required that all parts of carriages be kept free from rust at all times. If this be allowed to accumulate, its removal from bearing parts, and especially piston rods, requires particular attention in order that clearances may not be unduly increased. The use of sandpaper for this purpose is forbidden, and emery cloth No. 1 should be used, the rust being softened, if necessary, by kerosene.

The retracting wire ropes should at all times be kept well oiled with raw linseed oil.

If any leakage occurs from the hydraulic recoil system, it should be immediately remedied, calling if necessary upon the district armament officer for the services of skilled labor.

The repacking of stuffing boxes may be done, when necessary, by trained enlisted men under the supervision of an officer, but will preferably be done by skilled labor.

Before removing a cylinder head containing a stuffing box, or drawing a piston rod through a stuffing box, the pressure of the packing on the rod should be released by unscrewing the follower or gland several turns.

The copper gaskets between cylinders and their heads should be in good condition, and consequently should be replaced whenever necessary in order to prevent leakage.

Cleaning Hydraulic Cylinders.—Recoil and buffer cylinders should be emptied and refilled at least every three months, and thoroughly cleaned every six months. For cleaning, a plumber's hand force pump is supplied to each Coast Artillery post, with about 10 feet of suction hose and 15 feet of discharge tube.

The following operations are outlined for cleaning the recoil cylinder:

(*a*) Retract the gun sufficiently to afford room for working below the recoil cylinder, remove the oil from the cylinder and the glands and followers.

(*b*) Remove the piston-rod bracket, locking disk and the upper cylinder head. Remove the lower piston-rod nut, screw the upper nut downward, raising the rod until the nut is removed. Allow the rod to rest on a block over its hole in the piston-rod beam.

(*c*) Run the gun slowly into battery by means of the retracting cranks, raising the ratchet pawls, and give the gun its maximum elevation. Raise the piston rod vertically until its upper end strikes the gun, then incline it to one side and remove it from the cylinder.

(*d*) Thoroughly clean the cylinder from its upper end with kerosene oil forced in with the hand pump, then wipe dry with clean cotton waste. Clean also the cylinder heads, glands, and followers; and the piston rod inside and out, removing the recoil valve.

(*e*) After the removal or evaporation of all kerosene oil, reassemble the parts and refill the cylinder with hydroline oil, carefully inspect all parts which were dismounted, and complete the retraction of the gun.

The following operations may be outlined for cleaning the buffer cylinders:

(*a*) Remove the glands, stuffing boxes, and pistons; and also the gland, valve stem, and emptying plug of the buffer valve.

(*b*) Clean the cylinders as described for the recoil cylinder. The equalizing and throttling pipes should also be thoroughly cleaned by forcing the oil into them with the pump, permitting it to run out through the emptying hole.

(*c*) After the removal or evaporation of all kerosene oil, reassemble the parts and refill the cylinders with hydroline oil, after which, close the buffer valve to its normal setting.

REMOVING PACKING FROM STUFFING BOXES.—A packing extractor for removing packing from the stuffing boxes of the recoil cylinder is issued to each post at which these carriages are mounted. To use the extractor, the gun must be retracted sufficiently to afford access to the stuffing boxes. Close the extractor around the piston rod and insert the locking pin, turn the extractor counter-clock wise, pressing it against the packing until the needles are firmly engaged. Draw the packing out, turning slowly counter-clock wise. Extractor bars are provided for use in starting the packing from its seat by inserting the toes of the bars in the rack teeth and prying over the edge of the box, being careful not to injure it.

The packing of the buffer cylinders and of the buffer valve can generally be removed with any pointed instrument by merely removing the glands. In case of difficulty, the stuffing boxes of the former can be removed and the packing taken out with the finger; and in the latter, the valve stem may be removed.

Repacking Stuffing Boxes.—Examine the old packing and discard all unfit for use. If any of the old packing is used, it should be put in after the new.

To repack a stuffing box after the packing has been removed, insert one ring of packing and force it well to the bottom of the box by a wooden stick and mallet. Treat each layer of packing in a similar manner, being careful that successive rings break joints. Six rings of packing are required for each stuffing box of the recoil cylinder, five rings for each stuffing box of the buffer cylinders, and four rings for the buffer valve.

In screwing up the glands or followers, *no other tools should be used than those provided for the purpose, nor should excessive force be applied to them, such as the addition of a pipe to the handle of the wrench.* Care should be exercised in tightening the glands to advance all of the bolts evenly so as not to throw the gland out of alignment. It will be found necessary to tighten the glands of the buffer cylinders but slightly. *Attention is invited to the caution given in regard to this under the description of the counter-recoil buffers.*

It is to be expected that a slight amount of oil will soak through and drip from boxes of carriages when not in use. Also when tightening the followers a slight amount of oil will squeeze out of the saturated packing. This oil should be caught and not allowed to render the carriage unsightly.

Filling Cylinders.—To fill the recoil cylinder, remove the filling plug and pour clean hydroline oil into it through a funnel until the oil overflows. *Allow any air that may be present to escape, then pour in more oil until the cylinder is again filled.* About 7.5 gallons are required. The cylinder should be filled with the gun slightly out of the recoiled position.

To fill the buffer cylinders, remove both filling plugs and pour clean hydroline oil through a funnel into one cylinder, allowing the air to escape from the other, until both cylinders are filled. *Allow any air that may be present to escape and pour in more oil until the system is again filled.* A full gallon of oil is required.

Service Condition (Lubrication, etc.).—When the carriage is to be kept in readiness for service, and is in daily or frequent use, all bearing parts must be kept thoroughly cleaned and lubricated. Especial attention should be given to the lubricating of trunnion beds, rollers, pintle surfaces, shaft bearings, and sliding surfaces; gun-lever axle beds, gun-lever pins, elevating screw, elevating band trunnions, crosshead guides, and the elevating, traversing, tripping, and retracting mechanisms, including the teeth of all gears.

The above parts should be lubricated at frequent intervals, whether the carriage is maneuvered or not. When carriages are in use for *daily drills a thorough lubrication twice each week should be sufficient for all but the most severely used parts.*

Proper lubricating and cleaning of the traversing rollers and their paths are essential to free working of the carriage. The dust guards should be removed to clean the upper roller paths. By removing the cover plates on the racer the traversing rollers may be lifted out with their bearings for cleaning and for cleaning the lower roller path.

Four oil plugs are screwed into steel tubes in the upper surface of the racer, outside of the front and rear of each chassis, which are provided with passages to the pintle surface. Eight oil plugs, two at each of the above points, are also provided, connected to brass tubes reaching down to the oil grooves of the distance ring, thus providing lubrication for the bearings of the rollers. Six additional of such oil pipes are also provided, two each at the front, right, and left of the racer for exceptional use in lubricating the roller bearings. They are closed by countersunk screws. *For oiling the rollers or pintle through these holes the carriage must be traversed in order to distribute the oil through the entire circumference.*

It will occasionally be necessary to examine all ball and roller bearings to see that the dust guards are in proper place and that the rollers themselves are clean. If they be found dirty, they may be flushed with kerosene oil; but care must be taken to fill the bearings with synovial oil after the kerosene has drained away. If the rollers have rusted, they must be removed and cleaned.

CONDITION "IN ORDINARY" (NOT READY FOR IMMEDIATE SERVICE).—If the carriage is to remain unused for a time, all unpainted surfaces should be covered with a *thin* coat of light slushing oil. It can be applied as in painting, using sash tool No. 6, except in cold weather, when it should be applied by stippling, i. e., light tapping, with the brush held perpendicular to the surface to be covered.

In all cases it should be applied in a thin coat, as this is all that is needed to give good protection.

This oil is easily removed by the use of burlap or waste dipped in kerosene oil. In order to save oil, the thickest of the slushing oil should be well removed by a scraper before applying the kerosene.

Before applying the slushing oil, the surfaces should be thoroughly cleaned, so as to be entirely free from rust, water, kerosene, or lubricating oil, as the first three would cause rusting underneath, and the latter would cause it to run off when heated.

Rollers and roller paths should be cleaned and slushed from time to time and the dust guards examined to see that the felt strips are in order and make the openings dust tight.

Experience has shown that hydraulic cylinders should not remain empty, as in that case the interior walls soon become rusty.

Oil Holes.—Oil holes should be cleaned out frequently to keep them free from sand and grit, and should habitually be kept closed by the screw plugs provided, except when in the act of oiling.

Before removing the plug from any oil hole carefully wipe off any dirt or grit near the opening that might be carried into the bearing with the oil.

Compression Grease Cups.—Where compression grease cups are provided similar precautions against dirt or grit must be observed. When adding grease to these cups do not fill them completely, but fill only to the bevel at the top of the cup; if too full, the leather packing will become inverted and will not act effectively. In putting on the cap see that the leather packing enters the cup without being caught or bent by the edge of the cup.

Screw the cap down on the cup until the spring rod projects about 0.25 inch above the top of the cap. The cap should be screwed down from day to day as required to maintain about this projection for the rod. When the cap is screwed nearly home the cup should be refilled.

Paints, Oils, and Grease.—**For information regarding paints, oils, cleaning material, and methods of using same, see Ordnance pamphlet, form No. 1869.**

List of implements furnished for 6-inch gun, models of 1903, 1905, and 1908.

1 rammer head and staff.
1 sponge head and staff in three sections; head to be made to fit bore or chamber by wrapping with burlap.
1 breech cover.
1 combined tompion and muzzle cover.
1 sponge cover, bore.
1 slush brush, with handle, to connect with sponge staff.
1 steel scraper and socket to fit sponge staff.

Spare parts for each 6-inch disappearing carriage, limited fire, model of 1905 Mi.

Garlock's waterproof hydraulic packing:
  4 rings, 0.375 inch square and 6.75 inches long each, for buffer-cylinder heads.
  1 ring, 0.25 inch square and 4 inches long each, for buffer valve.
  6 rings, 0.5 inch square and 11.062 inches long each, for recoil-cylinder heads.
Copper gaskets:
  4 for buffer-cylinder heads.
  2 for recoil-cylinder heads.
  2 for filling and drain plugs of recoil cylinder.
Fiber gaskets:
  1 dozen for equalizing or throttling pipe connections.
  1 dozen for drain plugs of gear covers, etc.
1 filling plug for recoil cylinder.
4 cylinder plugs to replace equalizing and throttling pipes, continuing the carriage in action after their injury.

12 dust-guard bolts for felt strips.
6 dust-guard bolts, outer dust guard to base ring.
12 bolts, bearings to distance rings.
4 dozen oil plugs.
6 drain plugs.
1 spare split pin for each one on the carriage, not to exceed, however, 1 dozen of any size.
1 spare taper pin for each one on the carriage, not to exceed, however, 6 of any size.
1 safety-latch pawl spring.
4 retracting-clutch springs.
1 pawl spring.[a]
1 firing leaf cord, complete.[a]
1 reel cord, complete.[a]
4 16-candlepower 110-volt lamps.
4 8-candlepower M lamps, 110 volts.
6 2-candlepower lamps, 110 volts.
2 N receptacles for 8-candlepower lamps.
3 receptacles for 2-candlepower lamps.

List of articles packed in the armament chest for 6-inch R. F. guns, models of 1903–1905 and 1908, on 6-inch disappearing carriages, model of 1905 M1.

[NOTE.—All articles marked * are carried loose in chest.]

For guns, models of 1903–1905–1908:
  3 brushes, cleaning, for primer seat.
  1 cloth, emery, No. 00, 1 quire.
  1 drift, bronze, large.
  1 drift, bronze, small.
  1 drill, gunner's.
  3 files, pillar, No. 6, 6-inch.[b]
  3 files, three-cornered, No. 4, 6-inch.[b]
  3 files, half-round, smooth, 8-inch.[b]
  3 files, round, smooth, 8-inch.[b]
  1 file, flat, dead smooth, 8-inch.
  1 file, round, second-cut, 8-inch.
  1 file, half-round, smooth, 8-inch.
  1 file, three-cornered, 8-inch.
  1 hammer, boiler maker's.
  1 hammer, copper.
  *1 lanyard, gunner's.
  1 mallet, hand.
  1 mallet, long handle.
  1 pliers, cutting, 7-inch.
  *1 pouch, gunner's.
  1 punch, gunner's.
  1 punch, pin.
  1 reamer, cleaning, for primer seat.
  1 scraper, metal.

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[a] For lanyard attachment.

[b] For use on bruised breechblocks. No other files to be used thereon.

For guns, models of 1903-1905-1908—Continued.

*1 pair sleeves, gunner's.
*3 sponges, wagon.
*4 balls twine, assorted.
*10 pounds cotton waste.
*2 pounds wire, copper, No. 12.
*2 pounds wire, copper, No. 16.
1 wrench, monkey, 12-inch.
1 wrench, monkey, 15-inch.
1 wrench, tit, for obturator.
***1 screw driver, bar, for spindle key, gear segment screws, etc.**

Additional implements for 1903 gun only:

1 spanner wrench for loading-tray latch nut.
1 tit wrench for obturator.
1 wrench for hinge-pin nut.

Implements for carriage:

1 extractor, gun-lever pins.
1 extractor, piston rod, and valve stem.
2 extractors, cylinder, cylinder head, and retracting clutch shaft.
1 extractor yoke, cylinder, and cylinder head.
1 file card (commercial).
2 hooks, counterweight.
1 hook, traversing roller.
2 oilers, half pint.
*1 oiler, locomotive—1 quart.
2 pinch bars.
1 screw driver, commercial, 3-inch blade.
1 screw driver, commercial, 5-inch blade.
1 screw driver and socket wrench.
1 wrench, double, 0.375 and 0.5 inch nuts.
1 wrench, double, 0.625 and 0.75 inch nuts.
1 wrench, double, 1 and 1.25 inch nuts.
1 wrench, double, 1.5 and 1.75 inch nuts.
1 wrench, double, 2.5 and 2.75 inch nuts.
1 wrench, single, 3-inch nuts.
1 wrench, single, 0.75-inch nuts.
1 wrench, throttling valve.
*1 wrench, single, piston rod.
*1 wrench, spanner, for recoil and buffer followers.

Names of parts of 6-inch disappearing carriage, L. F., model of 1905, M1, their piece marks and location.

The parts are listed alphabetically under the following headings: Carriage proper; counter-recoil system; azimuth pointer; the electrical equipment, including the firing circuits and safety firing switch, the shot truck, shot tongs, lanyard attachment, and grease cup.

For parts of the telescopic sight, sight cradle, sight arm, illuminating circuits of the sight, and sight cover see Form 1955.

When referring to a part always mention its piece mark, where given on the list.

CARRIAGE PROPER.

Piece mark.	Number.	Name of part.	Location.
	2	Angles, 3.5 by 2.5 by 0.25	For ladder brace.
	5	Angles, 3.5 by 3 by 0.312	Sighting platform.
H6S	1	Axle bed bushing, right	Top carriage.
H6T	1	Axle bed bushing, left	Do.
H6L	1	Axle cap, right	Do.
H6M	1	Axle cap, left	Do.
H13S	1	Axle, lower guide sheave	Rear clip and traversing bracket.
H13T	1	Axle, upper guide sheave	Rear transom.
H23K	1	Ball thrust bearing	Traversing gear.
H23L	1	....do	Do.
H16H	2	Band trunnion	Elevating band.
15H	1	Base	Elevation and range scale pointer.
H3D	1	Base ring	On concrete platform.
H4C	48	Bearings	For traversing rollers.
8T	8	Bolts	Front transom to chassis.
8P	4	....do	Transoms to chassis.
8Q	4	....do	Front transom to chassis.
8S	4	....do	Rear transom to chassis.
8P	18	....do	Transoms to chassis.
14P	2	....do	Gear covers.
14GA	1	Bolt	Gear cover.
14P	2	Bolts	Gear covers.
19K	4	....do	Traversing handwheel shaft gear cover.
19M	4	....do	Traversing crank shaft gear cover.
19A	2	....do	Traversing intermediate shaft gear cover.
19V	1	Bolt	Do.
20P	1	....do	Guide bracket to chassis.
20BA	1	....do	Special bolt on sight standard.
20Y	1	....do	Sight standard to chassis.
20M	2	Bolts	Do.
20M	2	....do	Guide bracket to chassis.
20Q	1	Bolt	Do.
20P	1	....do	Sight standard to chassis.
20Y	1	....do	Guide bracket to chassis.
22G	4	Bolts	Shoulder rest to bracket.
30B	8	....do	Retracting crank shaft brackets to chassis.
30R	2	....do	Retracting intermediate shaft brackets to chassis.
30S	2	....do	Do.
30T	2	....do	Do.
30U	2	....do	Do.
30M	8	....do	Clutch covers.
34I	12	....do	Axle to gun levers.
34Q	4	....do	Cap squares to gun levers.
21J	2	....do	Platform to platform bracket.
21K	1	Bolt	Ladder brace to platform.
21U	4	Bolts	Platform bracket to chassis.
21S	14	....do	Railing post foot to platform.
21G	4	....do	Ladder to platform.
H4P	16	....do	Distance ring sections.
H4Q	8	....do	Do.
H4L	4	....do	Outer dust guard clamp.
H6J	8	....do	Axle caps to top carriage.
H13F	4	....do	Rear clip to rear transom.
H15M	8	....do	Piston rod beam to guide frames.
H15D	4	....do	Piston rod bracket to front transom.
H16N	2	....do	Elevating band.
H18S	2	....do	Elevating gear cover.
H18R	2	....do	Do.
18Y	4	Bolts, countersunk head	Traversing clutch shaft bearing to sighting platform.
34M	2	Bolts, eye	Cap squares.
H6Q	2	....do	Axle caps.
H13A	2	....do	Weight.
27H	16	Bolts, tap	Crosshead gibs to guide clips.
30C	4	....do	Retracting crank shaft brackets to chassis.
30K	4	....do	Retracting clutch covers to chassis.
30Z	2	....do	Retracting clutch shaft plug.
32AB	6	....do	Cam bracket to chassis and guide frames.
19J	4	....do	Traversing handwheel shaft gear cover.
34P	4	....do	Yoke to gun levers.
27Q	4	....do	Key to crosshead.
21C	2	....do	Platform to sight standard.
21L	2	....do	Platform bracket to chassis.
18F	4	....do	Traversing intermediate shaft bearing, upper.
18AA	4	....do	Traversing intermediate shaft bearing, lower.
19G	12	....do	Recoil indicator scale and pointer.
20L	4	....do	Sight standard to vertical guides.
20N	4	....do	Sight standard to chassis.
20N	4	....do	Guide bracket to chassis.
20L	4	....do	Guide bracket to vertical guides.

CARRIAGE PROPER—Continued.

Piece mark.	Number.	Name of part.	Location.
20J	6	Bolts, tap	Racer plates.
20J	5	do	Do.
22E	3	do	Nut strip to shoulder rest.
22H	4	do	Shoulder rest bracket to sight standard.
22J	2	do	Traversing handwheel shaft bearing.
6G	14	do	Right chassis to racer.
7B	14	do	Left chassis to racer.
8K	4	do	Elevating screw support to front transom.
8L	4	do	Transoms and clips to racer.
8L	3	do	Do.
8L	4	do	Do.
8N	18	do	Elevating gibs to rear transom.
8R	2	do	Rear transom to chassis.
10DA	8	do	Cylinder head to cylinder.
10G	6	do	Cylinder to counterweight.
14H	2	do	Elevating clutch shifter rod bearing.
14H	3	do	Elevating connecting shaft bearing (upper) to chassis.
14R	1	do	Do.
14T	2	do	Elevating connecting shaft gear cover, to chassis.
14U	1	do	Elevating connecting shaft gear cover.
81D	2	do	For magneto bracket.
15C	2	do	Adjusting screw clamp.
15G	8	do	Base and dog to rear transom.
15N	11	do	Cover to base.
H3C	6	do	Traversing stop to base ring.
H4M	52	do	Inner dust guard to base ring.
H4M	52	do	Steel and felt strips.
H4N	24	do	Outer dust guard to base ring.
H4K	96	do	Bearings to distance ring.
H12P	2	do	Rope clamps to elevating slide nut.
H13B	2	do	Rear clip and traversing bracket to racer.
H15F	20	do	Vertical guides to guide frames and chassis.
H15A	4	do	Vertical guides to chassis.
27G	1	Bottom plate	Counterweight well.
27P	4	Bottom plate gibs	Clips of bottom plate.
27A	2	Bottom plate liners	Bottom plate.
H6W	2	Buffer rod cup	Top carriage.
H6B	36	Bushings	For rollers H6D.
H6C	36	do	For rollers H6F.
H12E	2	do	Elevating slide.
H13G	2	Bushings, short	Lower guide sheaves.
H13H	2	Bushings, long	Upper guide sheaves.
6F	1	Bushing	In right chassis.
6J	1	do	Do.
7F	1	do	In left chassis.
7G	1	do	Do.
7H	1	do	Do.
8D	1	do	In elevating screw support.
8J	1	Bushing, in halves	For transom cap.
10D	1	Bushing	In upper cylinder head.
10W	1	do	In lower cylinder head.
14V	1	do	In elevating connecting shaft bearing.
18E	1	do	
22K	1	do	Traversing hand wheel shaft bearing.
29D	2	Bushings	Retracting clutches.
29U	2	do	Retracting pawls.
34E	2	do	Gun lever pin bearings.
34G	2	do	Trunnion bearings.
H16S	2	do	Elevating arm bearings.
H18N	1	Bushing	Traversing clutch gear (H18Q).
30H	2	Bushing rings, halves	Retracting clutch covers.
30J	2	do	Do.
32X	1	Cam bracket, right	To chassis and guide frame.
32W	1	Cam bracket, left	Do.
34C	1	Cap square, right	Gun levers.
34D	1	Cap square, left	Do.
6A	1	Chassis, right	Bolted and keyed to racer.
7A	1	Chassis, left	Do.
8E	2	Clips, front	Front of racer to inside of front transom.
27W	10	Clip bolts	Guide clips to crosshead.
27X	6	do	Do.
18S	2	Clutch rod end	On traversing clutch rod.
18T	3	Clutch rod pin	For traversing clutch rod and plunger.
18W	1	Clutch rod spring	For traversing clutch plunger.
H4E	4	Clamps	Outer dust guard.
13B	4	Collars	On elevating shaft.
14D	1	Collar	On elevating connecting shaft gear (14M).
14E	1	do	On elevating connecting shaft gear (14L).
14BA	2	Collars	On elevating connecting shaft.
16BA	1	Collar	On traversing crank shaft.
16K	6	Collars	Do.

CARRIAGE PROPER—Continued.

Piece mark.	Number.	Name of part.	Location.
16D	1	Collar	On traversing handwheel shaft.
16G	1	....do	On traversing intermediate shaft.
16H	1	....do	Do.
29K	4	Collars	On retracting clutch shaft.
29W	2	....do	On retracting crank shaft.
32C	2	....do	On tripping lever shaft.
32F	2	....do	On safety latch shaft.
H13L	2	....do	On lower guide sheave axle.
	4	Corner braces	For sighting platform.
15L	1	Cover	For range scale.
32Y	1	Cover plate, right	Guide frame, right.
32Z	1	Cover plate, left	Guide frame, left.
16CA	3	Crank fastening	For retracting and traversing cranks.
7C	3	Crank handle hook	2 on right chassis, 1 on left chassis.
7D	3	Crank hooks	Do.
	2	Crosses	Sighting platform.
27B	1	Crosshead	Above counterweight.
27L	1	Crosshead gib, right	Guide clip.
27M	1	Crosshead gib, left	Do.
27N	2	Crosshead gibs	Do.
27S	1	Crosshead liner, right	Do.
27T	1	Crosshead liner, left	Do.
10C	1	Cylinder head, upper	Upper end of recoil cylinder.
10X	1	Cylinder head, lower	Lower end of recoil cylinder.
H4A	1	Distance ring	Between racer and base ring.
15M	1	Dog	Bolted to left side of elevating slide.
10JA	1	Drain plug	In lower cylinder head.
14N	1	....do	Gear cover (14Y).
14N	1	....do	Gear cover (14Z).
19C	1	....do	Gear cover (19D).
19C	1	....do	Gear cover (19S).
19C	1	....do	Gear cover (19F).
H16F	1	Elevating arm	Between elevating band and elevating slide.
H16J	1	Elevating band	Around gun.
H13N	1	Equalizing bar	For counterbalance device.
H13D	1	Equalizing bar fork	For counterbalance weight.
H13P	1	Equalizing bar pin	Connects bar and fork.
14L	1	Elevating connecting shaft gear	On elevating shaft; 42 teeth.
14M	1	....do	On elevating connecting shaft; 24 teeth.
14Q	1	Elevating clutch fork pivot	Elevating connecting shaft bearing.
14B	1	Elevating clutch shifter	On elevating clutch shifter rod (upper).
14C	1	Elevating clutch shifter rod	In elevating clutch shifter rod bearing.
14J	1	Elevating clutch shifter rod bearing	Rear end of left chassis.
14K	1	Elevating clutch shifter rod handle	On end of shifter rod.
14S	1	Elevating clutch	On elevating shaft.
14X	1	Elevating connecting shaft bearing, upper.	Bolted to left chassis.
14W	1	Elevating connecting shaft bearing, lower.	Do.
14CA	1	Elevating connecting shaft	Between elevating shaft and slow-motion shaft.
14FA	1	Elevating clutch fork	On elevating clutch-fork pivot.
14Z	1	Elevating connecting shaft gear cover	Covers elevating connecting shaft gear.
8F	1	Elevating gib, right	On rear transom.
8G	1	Elevating gib, left	Do.
H18T	1	Elevating gear cover, upper half	Covers elevating gears.
H18X	1	Elevating gear cover, lower half	Do.
13J	1	Elevating handwheel	On end of elevating shaft.
13E	1	Elevating handwheel, slow motion	On end of slow-motion shaft.
14F	1	Elevating handwheel shaft gear, slow motion.	On end of elevating connecting shaft 56 T.
14G	1	....do	On slow-motion handwheel shaft.
14EA	1	Elevating handwheel shaft, slow motion.	In elevating connecting shaft bearing (lower).
14Y	1	Elevating handwheel shaft-gear cover, slow motion.	Covers elevating handwheel shaft gears.
15S	1	Elevation pointer	For range scale.
H16E	1	Elevating pin	In lower end of elevating arm.
H12D	1	Elevating slide	In rear transom.
H12H	1	Elevating slide nut	In elevating slide.
H12J	1	Elevating slide spring	On elevating slide nut.
13A	1	Elevating shaft	Through chassis.
8C	1	Elevating screw support	At bottom of rear transom.
H12A	1	Elevating screw	In rear transom.
H12N	1	Elevating slide stop	On rear transom.
A5H	1	Elevation scale pointer	
H18E	1	Elevating shaft gear	On end of elevating screw; 27 T.
H18F	1	....do	On elevating shaft; 20 T.
18X	1	End	Part of traversing clutch plunger.
	4	Filler plates, 3 by 0.312	For sighting platform.
10CA	2	Filling plugs, 1 extra	In upper cylinder head.
H23BA	2	Filling plug instruction plates, curved.	On tops of recoil cylinders.

CARRIAGE PROPER—Continued.

Piece mark.	Number.	Name of part.	Location.
H23CA	1	Filling plug instruction plate, straight.	
H4H	4	Fishplates	On outer dust guard.
21B	1	Floor	Sighting platform.
10EA	2	Followers	In upper and lower cylinder heads.
18P	1	Foot piece	Part of traversing clutch plunger.
	2	Gaskets, copper	For plugs (10PA).
	1	Gasket, copper	For lower cylinder head.
	2	Gaskets, copper	For upper cylinder head.
10J	2	Glands, in halves	In upper and lower cylinder stuffing boxes.
20Z	1	Guide bracket	Bolted to left chassis.
27J	1	Guide clip, right	On crosshead.
27K	1	Guide clip, left	Do.
H6A	36	Gears	For recoil rollers.
H13J	2	Guide sheave, upper	In rear transom.
H13K	2	Guide sheave, lower	On rear clip and traversing bracket.
H15L	1	Guide frame, right	On chassis.
H15K	1	Guide frame, left	Do.
34H	1	Gun-lever axle	On top carriage.
34A	1	Gun lever, right	On gun-lever axle.
34B	1	Gun lever, left	Do.
27Y	2	Gun-lever pin	In top carriage.
34J	1	Gun-lever yoke	Between gun levers.
10AA	1	Hasp	On hasp bracket.
10Z	1	Hasp bracket	On piston-rod bracket.
15K	1	Index plate	In cover.
15J	1	do	Do.
	4	Keys	Elevating shaft.
	1	Key	Slow-motion elevating handwheel shaft.
	2	Keys	Traversing crank shaft.
	1	Key	Do.
	1	do	Traversing handwheel shaft.
	2	Keys	Traversing intermediate shaft.
	2	do	Traversing pinion shaft.
27V	2	do	For gun-lever pins.
	2	do	Retracting intermediate gears.
	1	Key	Retracting crank-shaft pinion.
	1	do	Retracting pawls.
	2	Keys	Retracting clutch lever pin.
	1	Key	Tripping-lever shaft.
	1	do	Safety-latch shaft.
	1	do	Elevating screw.
H15Q	2	Keys	Guide frames.
	2	Keys, gib	Retracting intermediate shaft.
	4	do	Retracting bevel gears.
	2	do	Retracting crank shaft.
	2	do	Tripping-lever shaft.
	2	do	Safety-latch shaft.
21M	1	Ladder	Fastened to sighting platform.
21H	2	Ladder brace	From ladder to sighting platform.
H3E	12	Leveling screws	In base ring.
H12B	1	Liner, right	For elevating slide.
H12C	1	Liner, left	Do.
10FA	1	Liner	In lower cylinder head.
10K	1	Locking disc	On top of piston rod.
10HA	1	Lockscrew	For locking piston on rod.
81E	1	Magneto bracket	On shoulder rest bracket.
10R	1	Nut	On piston rod.
10S	1	do	Do.
13D	1	do	On elevating shaft.
14A	1	do	For elevating clutch shifter rod.
14DA	1	do	Slow-motion elevating handwheel shaft.
14AA	1	do	Do.
14AA	2	Nuts	Elevating connecting shaft.
16B	1	Nut	Traversing intermediate shaft.
16C	1	do	Traversing handwheel shaft.
16B	1	do	Do.
16F	1	do	Traversing intermediate shaft.
16M	2	Nuts	Traversing pinion shaft.
20F	2	do	Sight-arm bracket pins.
27U	8	do	Suspension rods.
H6V	36	do	For roller axles.
H6X	2	do	For buffer-rod cups.
H12M	1	Nut	Elevating slide stop.
H13C	1	do	Equalizing bar fork.
22D	1	Nut strip	Shoulder-rest bracket.
10NA	1	Oil gutter	Piston-rod beam.
19L	1	Oil pipe	Traversing handwheel-shaft-gear cover.
H14D	12	Oil tubes	For oiling pintle bearing.
	18	Packing, Garlock's waterproof, rings	Upper and lower stuffing boxes.
	1	Padlock, Yale standard No. 853	For locking-buffer valve.
32U	2	Pawl fulcrums	For safety-latch pawl.
30L	4	Pins	Retracting clutch covers.

CARRIAGE PROPER—Continued.

Piece mark.	Number.	Name of part.	Location.
	12	Pins	Bushing rings (30J).
	20	do	Bushing rings (30H).
	32	do	For rack-retaining screws.
	8	do	For bushing (H12E).
	1	Pin	Elevating slide stop.
6E	52	Pins	For rack-retaining screws.
	2	do	For bushing (6F).
	2	do	For bushing (6J).
	2	do	For bushing (7F).
	2	do	For bushing (7G).
	2	do	For bushing (7H).
	1	Pin	For bushing (8D).
	1	do	For plug (10PA).
	2	Pins	Fasten valve body to stem.
	4	do	Fasten liners to pistons.
	4	do	For collars 14D and 14E.
	1	Pin	For elevating connecting-shaft bearing (lower).
	4	Pins	For bushings H13G and H13H.
	2	do	For bushing H18N.
	1	Pin	For pointer lid.
	2	Pins	For bushing (22K).
	4	do	For bushing (29D).
29H	12	do	For retracting clutch.
6H	2	Pins, dowel	For right chassis.
7E	2	do	For left chassis.
	1	Pin, split	For taper pin for nut (10R).
	1	do	For nut (10S).
	1	do	For nut (13D).
	5	Pins, split	For gear and collars on elevating shaft.
	1	Pin, split	For elevating clutch-fork pivot.
	1	do	For nut (14A).
	1	do	Elevating connecting-shaft bearing (upper)
	1	do	For nut (14AA).
	1	do	For nut (14DA).
	2	Pins, split	Taper pins for collars (14BA).
	2	do	Retracting clutch-lever pin.
	2	do	For taper pins for collars (32C).
	2	do	For taper pins for collars (32F).
	1	Pin, split	Tripping-lever shaft.
	1	do	Safety-lever shaft.
	2	Pins, split	Tripping-rod pins.
	8	do	For nuts (27U).
	1	Pin, split	For taper for spring-compressing nut.
	1	do	For nut (H12M).
	1	do	For taper pin for elevating screw.
	2	Pins, split	For taper pins for lower guide-sheave axle.
	2	do	For upper guide-sheave axle.
	1	Pin, split	For taper pin for rear clip.
	1	do	For nut (H13C).
	2	Pins, split	For equalizing bar pin.
	4	do	For rope-socket pins.
	1	Pin, split	For pin (H16K).
	2	Pins, split	For bolts (H16N).
	2	do	For taper pins for band trunnions.
	2	do	For nuts (14AA).
	1	Pin, split	For nut (16B).
	1	do	For nut (16C).
	1	do	For taper pin for collar (16D).
	1	do	For nut (16B).
	1	do	For nut (16F).
	2	Pins, split	For taper pins for collars 16G and 16H.
	2	do	For nuts (16M).
	1	Pin, split	For taper pin for traversing clutch plunger.
	2	Pins, split	For nuts (20F).
	4	do	For taper pins for collars (29K).
	1	Pin, split	For taper pin for retracting-pawl lever.
	2	Pins, split	For taper pins for collar (29W).
	1	Pin, taper	For nut (10R).
	1	do	For gear (H18F).
	4	Pins, taper	For collars (H13B).
	1	Pin, taper	Elevating clutch-shifter-rod handle.
	2	Pins, taper	Collars (14BA).
	2	do	For collars (32C).
	2	do	For collar (32F).
	2	do	Safety latch.
	1	Pin, taper	Spring-compressing nut.
	1	do	Elevating screw.
	2	Pins, taper	Lower-guide sheave axle.
	1	Pin, taper	Rear clip and traversing bracket.
	2	Pins, taper	For band trunnions.
	1	Pin, taper	Traversing crank shaft.

CARRIAGE PROPER—Continued.

Piece mark.	Number.	Name of part.	Location.
	1	Pin, taper	For collar (16D).
	2	Pins, taper	For collars 16G and 16H.
	1	Pin, taper	Traversing clutch plunger.
	4	Pins, taper	For collars (29K).
	2	.....do	Retracting intermediate gears.
	1	Pin, taper	Retracting-pawl lever.
	2	Pins, taper	For collar (29W).
H16K	1	Pin and washer	For elevating band.
	2	Pinch-bar hooks	On sighting platform.
10B	1	Piston and rod	In recoil cylinder.
10Q	1	Piston liner	On piston.
H15G	1	Piston-rod bracket	Bolted to front transom.
H15C	1	Piston-rod beam	Bolted to lower ends of guide frames.
	10	Plates, handhole	On racer.
21P	1	Platform bracket	Supports sighting platform.
H3A	18	Plugs	For traversing stop-bolt holes.
30V	2	.....do	Retracting intermediate shaft brackets.
10PA	1	Plug	In upper cylinder head.
15P	1	Pointer lid	Range scale and pointer.
15R	1	Pointer-lid hinge	For pointer lid.
H14A	1	Racer	Rests on traversing rollers.
H14B	1	Racer liner	In racer.
20K	2	Racer cover plate	Screwed to racer.
20S	1	Racer right plate	On top of racer.
20R	1	Racer left plate	Do.
H6G	2	Racks, right	On top carriage.
H6H	2	Racks, left	Do.
6B	2	Racks, right	On chassis.
6C	2	Racks, left	Do.
H6E	32	Rack-retaining screws	For racks H6G and H6H.
6D	52	.....do	For racks 6B and 6C.
21T	7	Railing-post feet	On sighting platform.
15E	1	Range scale, subcaliber	Screwed to slide.
15D	1	Range scale, service	Do.
H13M	1	Rear clip and traversing bracket	On racer.
10A	1	Recoil cylinder	Inside of counterweight.
19H	2	Recoil-indicator pointer	On guide clips.
19Q	1	Recoil-indicator scale, right	On right chassis.
19R	1	Recoil-indicator scale, left	On left chassis.
29L	2	Retracting bevel gear	On retracting clutch shaft (64T).
29M	2	Retracting bevel pinion	On retracting intermediate shaft (13T).
29E	1	Retracting clutch, right	On retracting clutch shaft.
29F	1	Retracting clutch, left	Do.
29B	1	Retracting clutch pinion, right	Do.
29C	1	Retracting clutch pinion, left	Do.
30D	1	Retracting clutch cover, inside, right	Inside of right chassis.
30E	1	Retracting clutch cover, inside, left	Inside of left chassis.
30F	1	Retracting clutch cover, outside, right	Outside of right chassis.
30G	1	Retracting clutch cover, outside, left	Outside of left chassis.
30Y	2	Retracting clutch-shaft plug	In right and left chassis.
32G	1	Retracting clutch lever, right	Pivoted in right chassis.
32H	1	Retracting clutch lever, left	Pivoted in left chassis.
32A	2	Retracting clutch-lever pin	For retracting clutch levers.
32D	4	Retracting clutch-lever stud	In retracting clutch levers.
29A	12	Retracting clutch spring	In retracting clutches.
29J	2	Retracting clutch shaft	In bearings in right and left chassis.
29G	2	Retracting clutch sleeve	On retracting-clutch pinions.
30A	2	Retracting crank-shaft bracket	Bolted to right and left chassis.
29X	1	Retracting crank shaft	Through chassis.
29Y	2	Retracting crank	On retracting crank shaft.
29AA	2	Retracting crank-shaft pinion	On retracting crank shaft (13T).
30W	1	Retracting bevel-gear guard, right	Bolted to outside of right chassis.
30X	1	Retracting bevel-gear guard, left	Bolted to outside of left chassis.
H23S	1	Retracting direction plate, right	On right chassis.
H23T	1	Retracting direction plate, left	On left chassis.
30P	1	Retracting intermediate shaft bracket, right.	Bolted to inside of right chassis.
30Q	1	Retracting intermediate shaft bracket left.	Bolted to inside of left chassis.
29N	2	Retracting intermediate gear	On retracting intermediate shaft (122T).
29V	1	Retracting intermediate shaft	Between chassis.
29BA	1	Retracting pawl-spring lever	On retracting-pawl stud.
29P	1	Retracting pawl stud	Inside of left chassis.
29Q	1	Retracting pawl shaft	In bearing in left chassis.
29R	1	Retracting pawl lever	On retracting-pawl shaft.
29S	1	Retracting pawl, inside	Do.
29T	1	Retracting pawl, outside	Do.
29DA	1	Retracting pawl spring	On retracting-pawl stud.
29Z	1	Retracting ratchet wheel	On retracting-crank shaft (50T).
10GA	2	Rings, spring	In upper cylinder head.
H6D	18	Rollers	Under top carriage.
H6F	18	.....do	Do.

CARRIAGE PROPER—Continued.

Piece mark.	Number.	Name of part.	Location.
H6K	36	Roller axles	For rollers H6D and H6F.
H23A	2	Roller bearings	Elevating gear.
H23B	5	do	Elevating and traversing gear.
H23D	6	do	Retracting gear.
H23F	6	do	Do.
H6N	2	Roller cage side frame	For rollers under top carriage.
H6P	2	do	Do.
H13R	1	Rope	For counterbalance device.
H12F	1	Rope clamp, right	On elevating slide.
H12G	1	Rope clamp, left	Do.
H13Q	2	Rope socket pins	In clevises.
22C	1	Rubber tube	On shoulder rest.
32J	1	Safety latch, right	On right chassis.
32K	1	Safety latch, left	On left chassis.
32Q	1	Safety-latch handle	On safety-latch shaft.
32T	1	Safety-latch pawl, right	In crosshead.
32AA	1	Safety-latch pawl, left	Do.
32S	2	Safety-latch pawl spring	In safety-latch pawls.
32E	1	Safety-latch shaft	Through chassis.
15F	2	Screws	For index plates.
15F	10	do	For range scales.
20AA	8	do	Racer cover plates.
34R	32	do	Gun-lever yoke bushings.
H6R	16	do	Axle-bed bushings.
H18H	60	do	For traversing rack.
15B	2	Screws, adjusting	Traversing rack.
10Y	2	Screws, countersunk	For slide.
15Q	2	do	Pointer-lid hinge.
27Z	12	do	Crosshead gibs.
34N	24	do	For gun lever washers.
	6	do	For closing oil tubes in racers.
H14C	32	do	Racer liner.
H16D	18	do	Elevating arm washers.
H23U	27	do	For attaching direction plates.
10L	1	Screw, filister head	For locking valve-stem nut.
	8	Screws, filister head	For cover plates.
15T	1	Screw, headless, set	For locking elevation pointer.
	8	Screws, headless	Retracting clutch pinions.
20G	2	Screws, set	On sight standard.
H16A	1	Screw, set	Elevating arm.
22F	1	Shoulder rest	On shoulder-rest bracket.
22B	1	Shoulder-rest bracket	On sight standard.
A5E	2	Side liner, long	On sight arm.
A5F	2	Side liner, short	Do.
A5A	1	Sight arm	Sight-arm bracket.
20E	2	Sight-arm bracket pins	In sight-arm bracket.
A5D	1	Sight arm oil screw	In sight arm.
A5G	1	Sight shank liner	On sight arm.
20B	1	Sight standard	Bolted to left chassis.
H12K	1	Spring compressing nut	In elevating slide.
18R	1	Spring stirrup	Sighting platform.
13C	1	Sleeve	Elevating shaft.
13G	2	Sleeves	On handles of slow motion elevating handwheels.
16S	1	Sleeve	On handle of traversing handwheel.
15A	1	Slide	In range scale base.
13H	1	Stem and washer	Elevating handwheel.
13F	1	do	Slow motion elevating handwheel.
16T	1	do	Traversing handwheel.
H4G	1	Strip	Outer dust guard.
8M	2	Studs	Rear transom.
34S	4	do	Elevating arm.
34K	4	do	Do.
27R	4	Suspension rods	For counterweight.
21E	3	Tees	Sighting platform railing
H3F	12	Thrust plates	Under base ring.
H6U	1	Top carriage	On rollers on chassis.
8A	1	Transom, front	Connects right and left chassis.
8B	1	Transom, rear	Do.
8H	1	Transom cap	Rear transom.
16J	1	Traversing crank shaft	Through chassis.
16A	1	Traversing handwheel shaft	In traversing handwheel shaft bearings.
16R	1	Traversing handwheel	On traversing handwheel shaft.
16E	1	Traversing intermediate shaft	Between traversing handwheel shaft and traversing crank shaft.
16V	1	Traversing crank	On traversing crank shaft.
16L	1	Traversing pinion shaft	In rear clip and traversing bracket.
18G	1	Traversing intermediate shaft bearing, upper.	On sight standard.
18Z	2	Traversing clutch shaft bearing	Under sighting platform floor.

CARRIAGE PROPER—Continued.

Piece mark.	Number.	Name of part.	Location.
18DA	1	Traversing foot lever	On end of traversing clutch shaft.
18CA	1	Traversing clutch shaft	In traversing clutch shaft bearings.
18FA	1	Traversing clutch shaft lever	On end of traversing clutch shaft.
18U	1	Traversing clutch fork	Fastened to traversing clutch lever.
18V	1	Traversing clutch lever	On end of traversing clutch rod.
19S	1	Traversing handwheel shaft gear cover.	Covers handwheel shaft gears.
19F	1	Traversing crank shaft gear cover	Covers crank shaft gears.
19D	1	Traversing intermediate shaft gear cover.	Covers intermediate shaft gears.
22M	1	Traversing handwheel shaft bearing	On shoulder rest bracket.
H3B	2	Traversing stop	On base ring.
H18A	1	Traversing crank shaft gear	On traversing pinion shaft (90T).
H18B	1	do	On traversing crank shaft (20T).
H18G	1	Traversing pinion	On traversing pinion shaft.
H18W	1	Traversing clutch	On end of traversing crank shaft.
H18J	1	Traversing rack	On interior of base ring.
H18P	1	Traversing clutch gear	On end of traversing intermediate shaft(20T).
H18Q	1	do	On traversing crank shaft (64T).
H18K	1	Traversing handwheel shaft gear	On end of handwheel shaft (15T).
H18L	1	do	On end of traversing intermediate shaft(70T).
H23V	1	Traversing direction plate	On right chassis.
H4B	24	Traversing rollers	Between racer and base ring.
32B	1	Tripping lever shaft	Between chassis.
32L	2	Tripping rods	Connect tripping lever shaft and clutch levers.
32M	4	Tripping rod pins	For tripping rods.
32N	4	Tripping rod end	For ends of tripping rods.
32R	1	Tripping lever	On end of tripping lever shaft.
32V	2	Tripping rod crank	On tripping lever shaft.
32P	1	Tripping lever stop	Screwed in left chassis.
10GA	1	Tube	In upper cylinder head.
16U	1	do	For handle of traversing crank.
	2	Tubes	For handles of retracting cranks.
H14E	14	do	For oil tubes.
10M	1	Valve stem nut	In end of piston rod.
10N	1	Valve stem	In piston rod.
10P	1	Valve body	On valve stem.
H15H	1	Vertical guide, right	On chassis and guide frames.
H15J	1	Vertical guide, left	Do.
H18D	1	Washer	Elevating shaft gear (H18F).
H18C	1	do	Traversing crank shaft gear (H18B).
H18M	1	do	Traversing handwheel shaft gear (H18U).
H12L	1	do	Elevating slide stop.
H16B	2	Washers	Lower end of elevating arm.
H16C	4	do	Upper end of elevating arm.
34F	4	do	Gun levers.
27F	6	Weights, first to sixth layers	In counterweight well.
27C	2	Weights, eighth layer	Do.
27D	2	Weights, seventh layer, side pieces	Do.
27E	1	Weight, seventh layer, inside piece	Do.
H13E	1	Weight	For counter-balance device.

COUNTER RECOIL SYSTEM.

H7L	1	Buffer cylinder, right	Forward ends of roller paths of chassis.
H7M	1	Buffer cylinder, left	Do.
H7D	4	Buffer followers	Buffer stuffing boxes.
H7Z	4	Buffer glands	Inside of followers.
H7H	2	Buffer pistons and rods	In bores of buffer cylinders.
H7J	2	Buffer piston liners	Around buffer piston heads.
H7K	4	Buffer springs	On each side of buffer cylinders.
H7B	4	Buffer spring covers	Surrounds buffer springs.
H7A	4	Buffer spring rings	Inside of buffer spring covers.
H7E	4	Buffer spring rods	Inside of buffer springs.
H7F	4	Buffer spring supports	Rear ends of buffer spring rods.
H7C	4	Buffer stuffing boxes	Close ends of buffer cylinders.
H7G	2	Buffer yokes	Connected to front ends of buffer spring rods and to buffer pistons.
H7Y	2	Bolts	For clamps H7X.
H7W	4	Bolts, tap	For clamps H7V.
H7N	8	Bolts	Buffer cylinders.
H7P	4	Bolts, tap	Do.
H7X	2	Clamps	Inside of front transom.
H7V	2	do	On front transom.
	8	Collars	Pipe connections.
H8D	4	Couplings	Equalizing and throttling pipes to buffer valve.
H8C	1	Disc	Buffer valve.
H8J	1	Emptying plug	Do.

COUNTER RECOIL SYSTEM—Continued.

Piece mark.	Number.	Name of part.	Location.
H7S	1	Equalizing and throttling pipe, right	Join buffer cylinders to buffer valve.
H7DA	1	Equalizing and throttling pipe, left	
H7T	1	Equalizing and throttling pipe, right	
H7EA	1	Equalizing and throttling pipe, left	
H8E	4	Followers	Equalizing and throttling pipes to buffer cylinder.
H8T	1	Follower	
H7Q	4	Filling plugs, including two extra	Buffer cylinders.
	4	Gaskets	For buffer stuffing boxes.
H8K	1	Gland	Around valve stem.
	1	Padlock, Yale standard, No. 853	Locks valve disk.
	2	Pins	Buffer piston liners to buffer pistons.
	1	Pin	Disk.
	8	Rings	Equalizing and throttling pipes.
	2	Screw pins	Disk.
	2	Split pins	Buffer yokes to buffer piston and rods.
	4	.....do	Buffer yokes to buffer spring rods.
	4	.....do	Buffer spring supports.
	1	Split pin	Valve stem.
	4	Taper pins	Buffer spring supports.
	2	.....do	Buffer yokes to buffer piston.
	4	.....do	Buffer yokes to buffer spring rods.
H8A	1	Valve handle	Buffer valve.
H8L	1	Valve seat	Do.
H8F	1	Valve body	Bolted to top of opening in front transom.
H8B	1	Valve stem	Seated in valve body.
H8H	1	Washer	Stuffing boxes of buffer valve.
	8	Washers	Pipe connections.

AZIMUTH POINTER.

H5P	1	Azimuth circle	Screwed to top of base ring.
H5C	1	Azimuth pointer body	On right side of racer.
H5G	1	Coaming	Screwed to racer.
H5J	1	Collar	On screw H5K.
	1	Dowel	For scale.
H5S	1	Hinge pin	Joins hinge and lid.
H5A	1	Index	Attached to slide.
	2	Index marks	Azimuth pointer body.
H5F	1	Lid	Covers azimuth pointer.
H5E	1	Nut	On screw H5K.
	1	Pin	Secures sleeve H5L.
H5D	1	Scale	On lower edge of azimuth pointer body.
H5K	1	Screw	Azimuth pointer body.
H5H	12	Screws, machine, countersunk head	Coaming to racer.
H5L	1	Sleeve	End of screw H5K.
H5M	1	.....do	Do.
H5R	1	Slide	Azimuth pointer body.
	1	Taper pin	Collar.

ELECTRICAL EQUIPMENT, MODEL OF 1905 MI.

V19B	1	Base	Terminal box.
T25B	1	Bolt with nut	For bracket (T25A).
T25K	1	.....do	For pipe clamp (T25J).
T6L	7	Bolts, tap	For straps (T6G).
V19W	12	Bolts, special	For attaching terminals to base.
V19Q	6	Bolts, tap	For securing cover to terminal box.
E14D	4	.....do	For portable lamp plug box and hook.
V19G	4	.....do	Terminal box to base ring.
T25BL	2	.....do	For junction box (T25BJ).
T25C	......	.....do	For straps.
V19Z	2	Bolts, expansion	For straps (V19EA).
P45K	......	.....do	For straps.
T24M	3	Bolts, countersunk	For straps (T6G).
T24N	1	Bolt, through	For strap (T6G).
T24P	1	.....do	Do.
T25A	1	Bracket	Secured to piston-rod beam for supporting forward end of flexible hose.
T25M	1	.....do	For azimuth pointer lamp.
E12U	2	Bushings	For lamp fitting.
V23AM	1	Bushing	In tee (V23BC).
E12S	1	Cap	Lamp fitting (E12R).
	1	Cable, flexible, reinforced	Portable lamp.
T24U	1	Conduit support	On piston-rod beam.
V19EA	1	Conduit strap, complete	For 2-inch conduit.
V19K	2	Coupling nuts	For flexible hose.
V23EA	2	Couplings	2-inch pipe conduit in counterweight well.

ELECTRICAL EQUIPMENT, MODEL OF 1905 M_I—Continued.

Piece mark.	Number.	Name of part.	Location.
V23AA	12	Couplings	For 0.5-inch conduits.
V23BA	2	.....do	For 0.75-inch conduits.
V23CA	5	.....do	For 1.25-inch conduits.
V19C	1	Cover	For terminal box.
V23AJ	8	Elbows	For 0.5-inch conduits.
V23BJ	2	.....do	For 0.75-inch conduits.
V23AL	1	Elbow, side outlet	On sighting platform.
	5	Firing circuit, branches of	Connect electrical firing apparatus.
T25BK	1	Gasket	Junction box (T25BJ).
P45F	1	Ground connection	On gun.
E12Y	2	Hooks, twisted	For cable thimbles.
E14C	1	Hook	For portable lamp and cable.
V19M	1	Hose, flexible, metallic	Counterweight well.
V19N	2	Hose fittings	For flexible hose.
V23AN	1	Insulator, outlet, 0.5-inch	For 0.5-inch conduit.
T25CA	1	Junction box and cover	On left chassis.
T25BJ	1	.....do	On racer in front of rear transom.
T25BU	1	.....do	On right chassis.
T24R	1	Junction box	Under right chassis.
E14A	1	Lamp, portable	At rear of right chassis.
E13AK	3	Lamps, 16-candlepower	On chassis and top carriage.
E12NA	4	Lamps, 8-candlepower	Azimuth and elevation pointer.
E12Q	4	Lamp springs	For electric lamps.
	1	Magneto, firing complete	On firing magneto bracket.
V19BA	12	Marking plates	For terminal box.
V23AW	1	Nipple, chase, 0.5-inch	
V23LT	3	Nipple, close, 0.5-inch	
V23AT	5	Nipple, short, 0.5-inch	
V23BT	1	Nipple, short, 0.75-inch	
V23JT	2	Nipple, short, 1.25-inch	
V23MT	2	Nipple, close, 0.75-inch	
V23CV	1	Nipple, 1.25 by 3	
V23AU	3	Nipples, long, 0.5 by 2.5	
E12T	3	Nuts	For lamp fitting.
V19X	36	Nuts, special	For base of terminal box.
	1	Outlet box	On brackets on left chassis.
	24	Pins	In terminal box.
	1	Pin	For pipe fitting (V19P).
	2	Pins	For terminal box fitting (V19E).
V19P	1	Pipe fitting	On flexible metallic hose.
T25J	1	Pipe clamp	Near elevation scale lamp.
V23A	3	Pipe plug, 0.5-inch	For conduit.
T25BN	3	Pipe strap	For conduit pipe.
V19J	1	Plate	In terminal box.
E14B	2	Plug box	At rear of right chassis.
P45T	10	Plugs	In branches of firing circuit.
E13AJ	4	Receptacle, candelabra	For lamps (E12NA).
P45P	10	Receptacles	In branches of firing circuit.
E12P	2	Reflectors	For recoil and buffer valve lamps.
T25G	1	Reflector, consisting of 1 shell, 1 bushing, 1 end, 1 support, 2 rivets.	For elevation pointer lamp.
T25P	1	Reflector, consisting of 1 shell, 1 bracket, 1 end, 3 rivets.	For azimuth pointer lamp.
V19T	1	Rubber pad	In terminal box.
T25H	2	Screws	For reflector T25G.
T25R	3	Screws. button-head	For reflector T25P.
T25N	2	Screws	For bracket T25M.
T25Q	2	.....do	For reflector T25P.
V19H	4	Screws, round-head	In terminal box.
V19R	2	Screws	For rubber pad.
T25BY	2	Sleeves	For junction box T25BJ.
P45J	10	.....do	In branches of firing circuit.
P45N	12	Sockets	Do.
E13AG	3	Socket holders	For sockets (E13AF).
E13AH	3	Socket	For candelabra lamps.
E13AF	3	.....do	For 16-candlepower lamps.
T25L	1	Shade, consisting of 1 shell, 1 end (closed), 1 end (with hole), 1 support, 9 rivets.	For lamp at center of carriage.
T25BT	2	Shades, consisting of 2 shells, 2 ends (closed), 2 ends (with holes), 2 brackets, 2 thumbscrews, 2 thumb nuts, 16 rivets.	For chassis lamps.
T6G	7	Straps	
T25BP	1	Strap	
T25B	2	Straps	
T25BV	1	Strap	
T25BW	1	.....do	
T6C	1	.....do	
T25E	3	Straps	
T44N	1	Strap	
P45Q	12	Straps	

ELECTRICAL EQUIPMENT, MODEL OF 1905 MI—Continued.

Piece mark.	Number.	Name of part.	Location.
T4R	1	Strap	
P45R	1	do	
P45S	2	Straps	
E13Q	1	Switch, Russell water-tight	On left chasiss.
E13B	1	do	Near elevation pointer lamp.
P45G	10	Swivels	For branches of firing circuit.
V23BC	1	Tee	Outside of left chassis.
V23AC	1	do	Inside of right chassis.
V19V	24	Terminals	In terminal box.
V19A	1	Terminal box	In counterweight well.
V19E	1	Terminal box fitting	In bottom of terminal box.
V19S	2	Washers	For rubber pad.
V19Y	24	do	For terminals.
P45AA	12	do	In branches of firing circuit.
	1	Wire, No. 14	For firing circuit.
	1	do	For lighting circuit.
E12Z	2	Washers, verona	For twisted hooks.

SAFETY FIRING SWITCH.

Piece mark.	Number.	Name of part.	Location.
P30F	2	Blades	Attached to lever.
P30E	2	Blocks	Between blades and lever.
P30S	6	Bolts, tap	For covers P30P and P42D.
35W	6	Bolts, through	For safety firing switch clip and lever base.
	2	Bushings	Lever base.
P30D	4	do	Insulated blades and clip blocks.
P30J	2	Clip blocks	Clip frame.
P51D	1	Clip base plate	Clip base.
P30G P30H	4	Clips	Riveted to extremities of clip blocks.
P42E	1	Clip frame	Riveted in bearing in clip base.
P42D	1	Cover	Secured to clip frame.
P30P	1	do	Bolted to stop.
2A	1	Cover, standard, No. 1	On lever base.
P42C	1	Handle	In bearing in lever base.
	1	Key, gib	Lever to handle.
P42A	1	Lever	Secured at one end to inner extremity of handle.
P51E	1	Lever plate	Lever base.
P30C	4	Nuts	Secure clip blocks and blades.
P51J	8	do	Clip-base and lever studs.
	4	Pins	Lever base.
	2	do	Secure stop to lever base.
	2	do	Riveted in clip frame.
	2	do	Between blocks and clip frame.
P51G	4	Plate bushings	Clip base plate and lever plate.
	4	Rivets	Clip blocks.
35X	1	Safety firing switch lever base	Bolted to left chassis.
35V	1	Safety firing switch clip base	Bolted to under left side of top carriage.
	1	Split pin	For taper pin of lever.
	4	Split pins	For nuts of blades.
P42B	1	Stop	Riveted in bearing in lever base.
P51A	2	Studs, clip base	Terminal attachment.
P51B	2	Studs, lever	Do.
P51H	4	Stud bushings	For clip base and lever studs.
	1	Taper pin	Lever.
	1	Terminal attachment	Do.
	1	do	Clip base.
P30B	4	Washers	Under nuts P30C.
P51K	2	do	Under nuts P51J.

SHOT TRUCK (4 PER CARRIAGE).

Piece mark.	Number.	Name of part.	Location.
FE1J FE1K	4	Angles	Front and rear vertical frames.
FE1L	2	do	Bolted above main axle brackets.
FE1T	2	do	Join angles A1J and A1K at top of truck.
FE1U	2	do	Connect angles A1J and A1K above caster wheels.
FE1P	2	Axle brackets, main	At middle of truck.
FE1C	1	Axle, main wheel	Pinned to main axle brackets.
FE1X	4	Bolts and nuts	Main axle brackets.
A48A	5	do	Main wheel rims.

SHOT TRUCK (4 PER CARRIAGE)—Continued.

Piece mark.	Number.	Name of part.	Location.
A48X	3	Bolts and nuts	Caster wheel rims.
FE1R FE1S	4	Braces	Join front and rear vertical frames to main axle brackets.
A48V	2	Bushings	Main wheels.
A48K	2	.....do	Caster wheels.
A48U	2	Detachable rims	Main wheels.
A48C	2	.....do	Caster wheels.
FE1Q	1	Handle	Rear end of truck.
	2	Nuts	Extremities of main wheel axle.
FE1F	2	Pins, caster wheel	Supported in bearings in lower ends of angles A1J and A1K.
	4	Plugs, 0.375 oil	1 for each wheel.
	4	Rivets	Angles A1L to shot supports.
	30	.....do	At various joints.
FE1G FE1H	2	Shot supports	Top of truck.
	2	Split pins	Secure caster wheel pins.
	2	.....do	For main axle taper pins
FE1M FE1N	2	Stops	Riveted to shot supports at rear ends.
	2	Taper pins	Through main axle brackets and main axle.
A48M	2	Tires	Caster wheels.
A48W	2	.....do	Main wheels.
A48E	2	Wheels, caster	Front and rear of truck.
A48T	2	Wheels, main	At extremities of main wheel axle.

SHOT TONGS, MODEL OF 1904 (7 PER CARRIAGE).

Piece mark.	Number.	Name of part.	Location.
A8N	1	Claw, inner	Opposite outer claw.
A8P	1	Claw, outer	In two parts pivoted on center pin.
A8S	1	Dog	Pivoted on center pin.
A8T	1	Pin, center	Forms pivot of claws and dog.
A8Q	1	Pin, shackle	In upper extremity of outer claw.
A8R	1	Shackle	Pivoted on shackle pin.
	2	Separators	Between two parts of outer claw.
	3	.....do	Between two parts of inner claw.
	2	Split pins	End of shackle pin.
	2	.....do	Ends of center pin.
	1	Spreader	Outer claw.
	1	.....do	Inner claw.

LANYARD ATTACHMENT.

Piece mark.	Number.	Name of part.	Location.
H23H	2	Bolts, tap	Lanyard cam.
H23Q	2	.....do	Lanyard filling piece.
A14E	1	Case	Bolted to lanyard filling piece.
A14KA	2	Case bolts with nuts	Case to lanyard filling piece.
A14N	1	Case cover	Left side of case.
A14W	1	Firing leaf cord	From firing leaf of breech mechanism to reel cord.
	1	Firing leaf hook	Firing leaf cord.
H23M	1	Lanyard cam	Bolted to elevating arm.
A14Q	1	Lanyard cord	Attached to end of reel cord.
H23P	1	Lanyard filling piece	Bolted to elevating band.
A14G	1	Lanyard guide	On rear of gun.
A14A	2	Lanyard guide screw	For attaching lanyard guide.
A14L	1	Nut	On spring shaft.
A14H	1	Pawl	Pivoted at front part of case.
A14D	1	Pawl pin	At pivot of pawl.
A14J	1	Pawl spring	Supported in case.
A14B	1	Pin	Reel.
A14M	1	.....do	Spring shaft.
A14F	1	Reel	In case.
	1	Ring	Unites firing leaf cord, lanyard cord, and reel cord.
A14R	1	Reel cord	Wound on reel.
	2	Snap hooks	Join firing leaf cord and lanyard cord to ring.
A14K	1	Spring	Inside of reel.
A14P	1	Spring shaft	At center of case.
A14C	1	Spring shaft pin	Through hub of case and through spring shaft.
	1	Thimble	Rear end of reel cord.
H23R	2	Washers	Lanyard filling piece.

GREASE CUP (8 PER CARRIAGE).

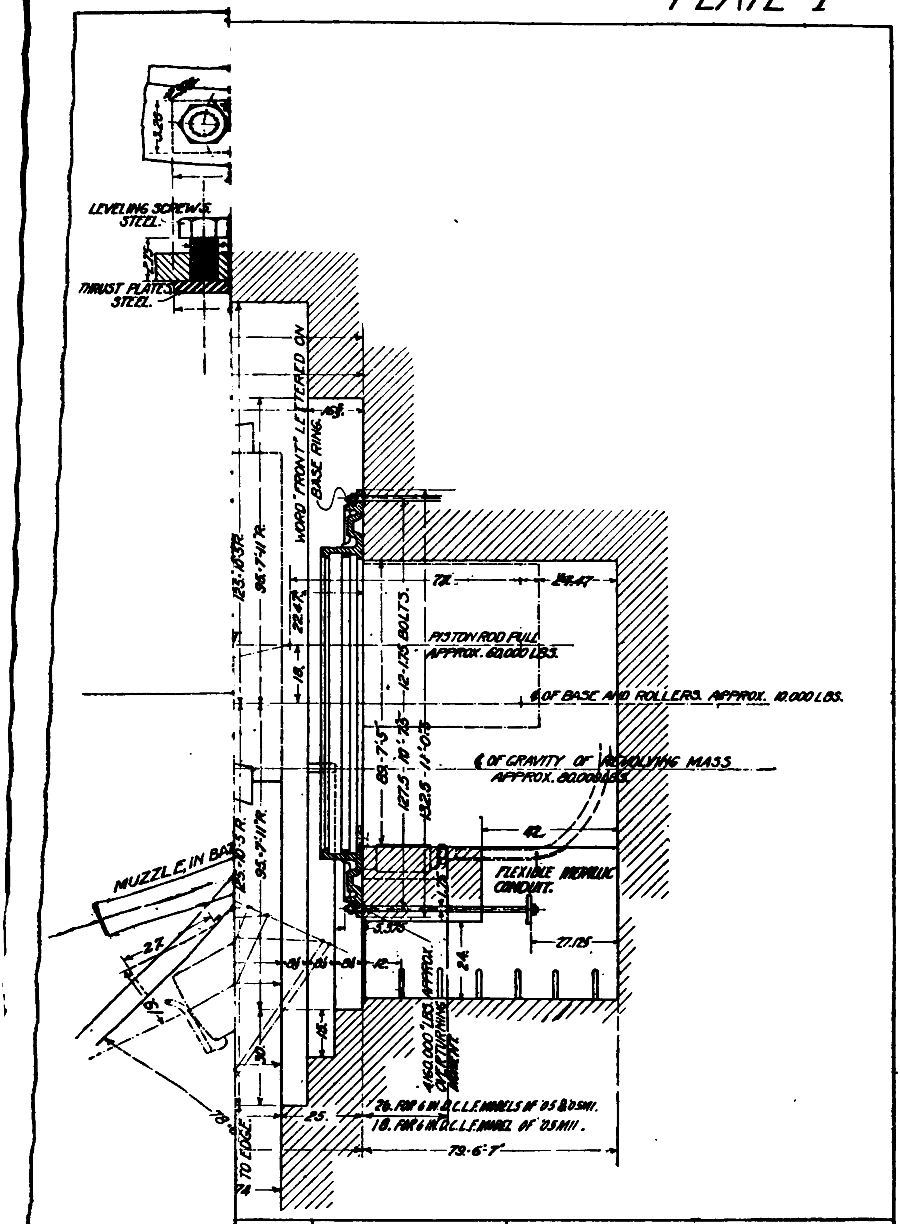
Piece mark.	Number.	Name of part.	Location.
A2A	1	Body	Screwed into carriage.
A2B	1	Cap	On upper end of body.
A2D	1	Cup leather	Underneath plunger.
	2	Gaskets	Between body and oil pipe when grease cup is seated on pipe connection.
A2E	1	Plunger	Inside of grease cup.
A2J	1	Plunger nut	Secures plunger to cap.
A2H	1	Screw	Secures cup leather to plunger.
A2F	1	Spring	Between cap and plunger.
A2C	1	Washer	Under cup leather.
A2G	1	Screw	In head of plunger.
A2K	1	Lock washer	
	1	Pin	In plunger.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ORDNANCE,
Washington, April 30, 1917.

October 29, 1908.
Revised April 30, 1917.
FORM No. 1704.
Ed. Apr. 30, 17—750.

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1917

PLATE I


3.25
LEVELING SCREWS STEEL.
2.75
THRUST PLATES STEEL.
WORD "FRONT" LETTERED ON BASE RING.
16.5
123.10.5 R.
95.7.11 R.
22.4 R.
18.
72.
24.47
12-1.75 BOLTS.
PISTON ROD PULL APPROX. 60,000 LBS.
℄ OF BASE AND ROLLERS. APPROX. 10,000 LBS.
℄ OF GRAVITY OF REVOLVING MASS APPROX. 80,000 LBS.
88.7.5
127.5 - 10.7.5
132.5 - 11.0.5
42.
FLEXIBLE METALLIC CONDUIT.
MUZZLE IN BA
123.10.5 R.
95.7.11 R.
27.
19.
73
5.375
27.125
1.75
24.
APPROX.
4,160,000 LBS. OVERTURNING MOMENT.
15.
30.
25.
26. FOR 6 IN. D.C.L.F. MODELS OF '05 & '05 MI.
18. FOR 6 IN. D.C.L.F. MODEL OF '05 MII.
79.6.7.
TO EDGE
74

ERTAINS TO		REVISIONS.	
DIV.	AS PLATF	FEB. 23, 1905	
14	PLATFORM	JAN. 4, 1906	
12	PLATFORM	JULY 15, 1907.	
15	PLATFORM	DEC. 20, 1907.	✓
		JUNE 21, 1909.	
		JUNE 25, 1910.	
		FEB. 18, 1911.	

PLATFORM

OFFICE OF THE CHIEF OF ORDNANCE, U.S.A. NOV. 16, 1904.

SUBMITTED:

CAPT. ORD. DEPT. U.S.A.

EXAMINED:

CAPT. ORDNANCE DEP'T.

APPROVED:

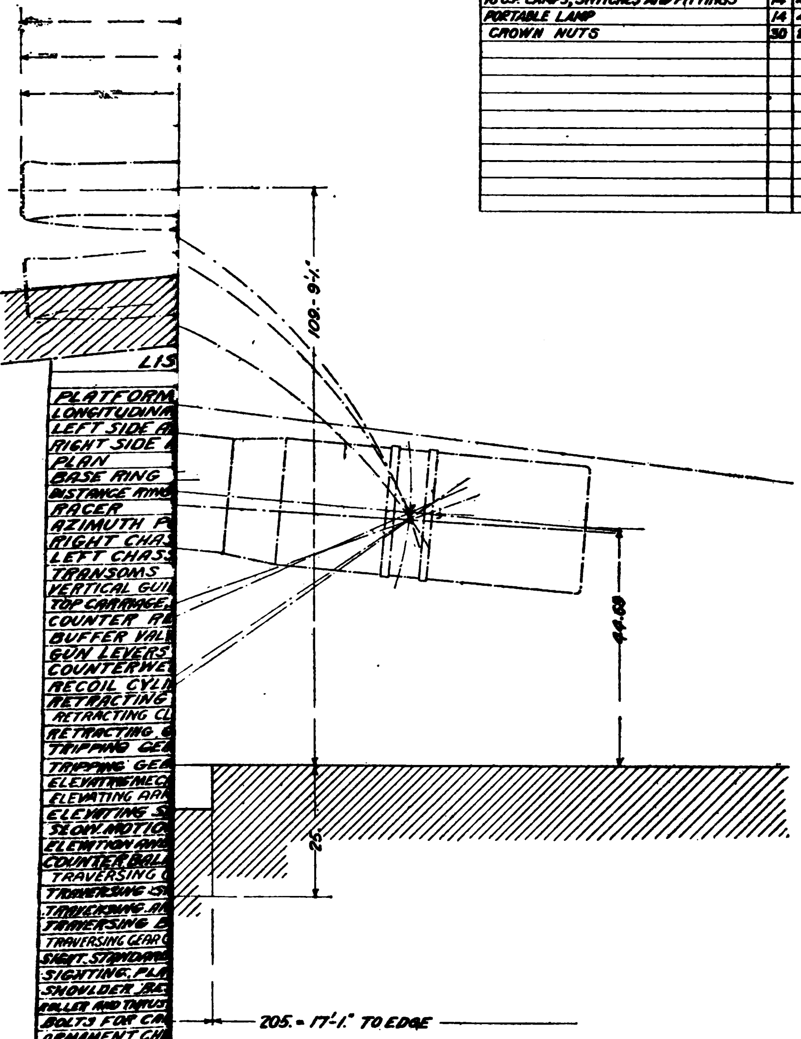
William Crozier

BRIGADIER GENERAL. CHIEF OF ORDNANCE.

CLASS 15 | DIVISION 7K | DRAWING 2 | FILE

PLATE II

STANDARD ELECTRICAL FITTINGS (COMMERCIAL)	14	0	23
8 C.P. LAMPS, DETAILS AND FITTINGS	14	4	12
16 C.P. LAMPS, SWITCHES AND FITTINGS	14	4	13
PORTABLE LAMP	14	4	14
CROWN NUTS	30	2	4



LIS

PLATFORM
LONGITUDINA
LEFT SIDE A
RIGHT SIDE
PLAN
BASE RING
DISTANCE RING
RACER
AZIMUTH P
RIGHT CHAS
LEFT CHASS
TRANSOMS
VERTICAL GUI
TOP CARRIAGE,
COUNTER RE
BUFFER VAL
GUN LEVERS
COUNTERWE
RECOIL CYLI
RETRACTING
RETRACTING CL
RETRACTING G
TRIPPING GE
TRIPPING GE
ELEVATING MEC
ELEVATING ARR
ELEVATING S
SLOW-MOTIO
ELEVATION AND
COUNTERBAL
TRAVERSING
TRAVERSING S
TRAVERSING AR
TRAVERSING B
TRAVERSING GEAR
SIGHT STANDARD
SIGHTING PLA
SHOULDER RE
ROLLER AND THRUST
BOLTS FOR CA
ARMAMENT CH
GREASE CUP
FIRING MAGNET
LANYARD ATTAC
SAFETY FIRING
SHOT TRUCK TY
SHOT TONGS M
SPLIT AND TAP
NAME PLATE

OIL PLUGS
TERMINAL BOX
CONDUITS-PLAN AN
CONDUIT AND WI
FIRING CIRCU
LIGHTING CABLES
3 INCH TELESC
COVER FOR 3 IN
SIGHT ARMS
TELEPHONE BR
ELEVATING GEAR
FIRING MAGNE

CARRIAGES EQUIPPED WITH TELEPHONES,
NOS. 11, 12, 13

'S PERTAINS TO
SS | DIV.

REVISIONS
DEC. 20, 1907
APR. 20, 1908
MAY 28, 1908
OCT. 10, 1908
JAN. 25, 1909
MAR. 12, 1909
JAN. 31, 1910
JULY 8, 1910
SEPT. 19, 1911.
DEC. 24, 1913.
OCT. 9, 1916.

6 INCH DISAPPEARING CARRIAGE
L.F.
MODEL OF 1905 M1
LONGITUDINAL SECTION.

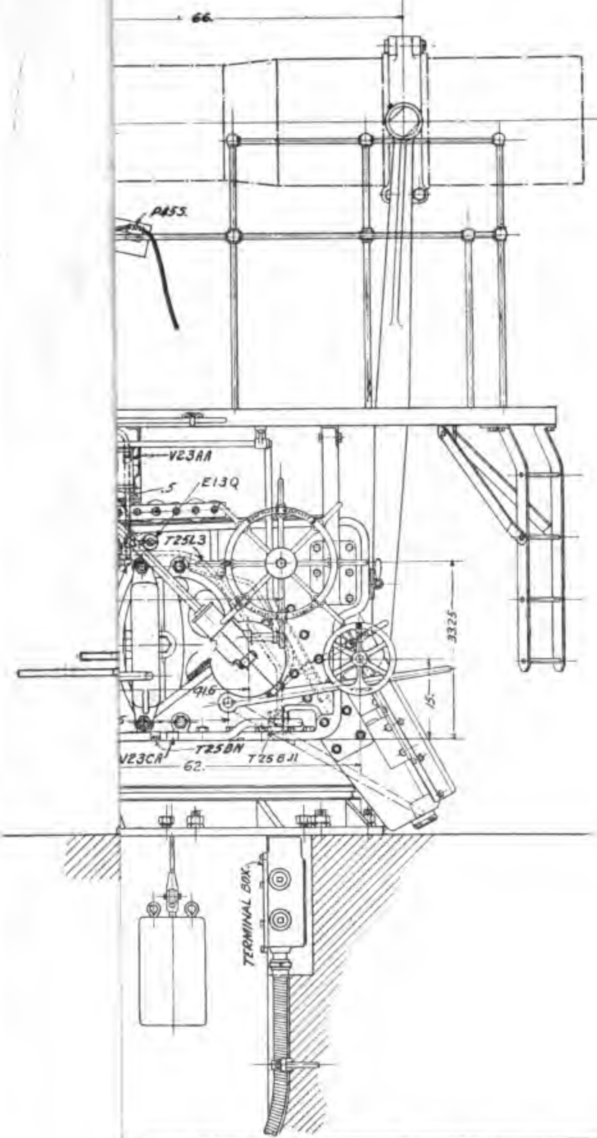
JULY 15, 1907

SUBMITTED:
MAJOR ORDNANCE DEPARTMENT, U. S. A.
EXAMINED:
MAJOR ORDNANCE DEPARTMENT, U. S. A.

O.R.M. C.H.F. J.B.R.
APPROVED:
William Crozier
BRIG. GEN., CHIEF OF ORDNANCE, U. S. A.

CLASS 7 | DIVISION 14 | DRAWING 1 | FILE

PLATE III



S PERTAINS TO			REVISIONS	
	DIV.		DEC. 20, 1907.	
			APR. 20, 1908.	
			MAY 26, 1908.	
			SEPT. 12, 1908.	
			OCT. 10, 1908.	
			JAN. 25, 1909	
			DEC. 1, 1909.	
			JAN. 31, 1910.	
			SEPT. 19, 1913	
			DEC. 29, 1913.	
			MAY 26, 1914.	
			OCT. 9, 1916.	

6 INCH DISAPPEARING CARRIAGE.
L.F.
MODEL OF 1905 M1.
LEFT SIDE AND FRONT VIEW.

JULY 15, 1907

SUBMITTED:

MAJOR ORDNANCE DEPARTMENT, U. S. A.

EXAMINED

MAJOR ORDNANCE DEPARTMENT, U. S. A.

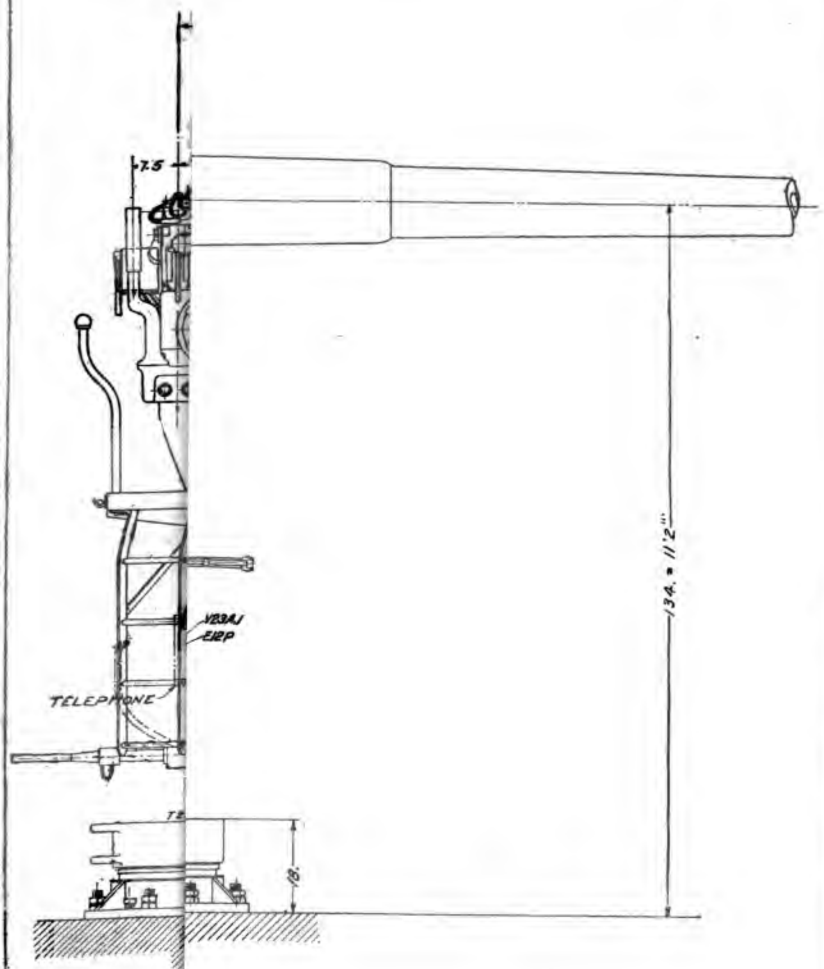
APPROVED:

William Crozier

BRIG. GEN., CHIEF OF ORDNANCE, U. S. A.

CLASS 7 DIVISION 14 DRAWING 2 FILE

PLATE IV



PERTAINS TO		REVISIONS	
DIV.		DEC. 20, 1907. APR. 20, 1908. MAY 28, 1908. SEPT. 12, 1908. OCT. 10, 1908. JAN. 25, 1909 DEC. 1, 1909. JAN. 31, 1910 SEPT. 19, 1913 DEC. 24, 1913. MAY 26, 1914. OCT. 9, 1916.	

6 INCH DISAPPEARING CARRIAGE.
L. F.
MODEL OF 1905 MI.
RIGHT SIDE AND REAR VIEWS.

JULY 15, 1907

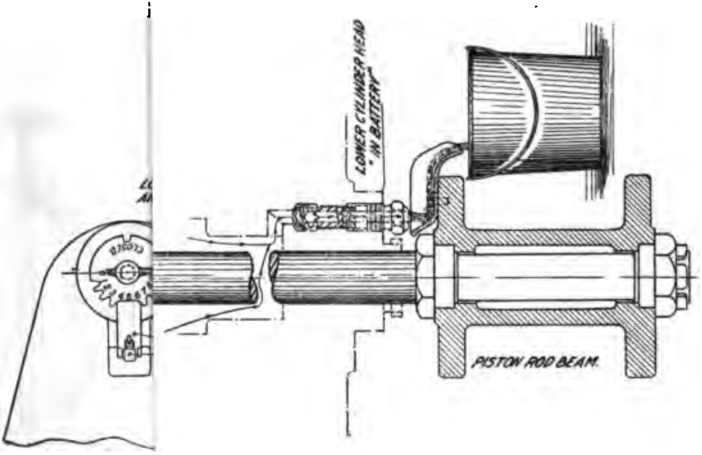
SUBMITTED:
MAJOR ORDNANCE DEPARTMENT, U. S. A.
EXAMINED:
MAJOR ORDNANCE DEPARTMENT, U. S. A.

J. S. C. | J. S. C. | C.H.F. | 2-14

APPROVED:
William Crozier
BRIG. GEN., CHIEF OF ORDNANCE, U. S. A.

CLASS 7	DIVISION 14	DRAWING 3	FILE

PLATE V



RTAINS TO
V.
AS PLATE

REVISIONS

METHOD OF CONTROLLING
ENERGY OF RECOIL.
DISAPPEARING CARRIAGES WITH
CYLINDER IN COUNTERWEIGHT.

OCT. 29, 1908.

SUBMITTED: R.R.B. A.E.J. RRB

MAJOR ORDNANCE DEPARTMENT, U. S. A.

EXAMINED:

MAJOR ORDNANCE DEPARTMENT, U. S. A.

APPROVED: BY ORDER OF THE CHIEF OF ORDNANCE,

MAJOR ORDNANCE DEPARTMENT, U. S. A.

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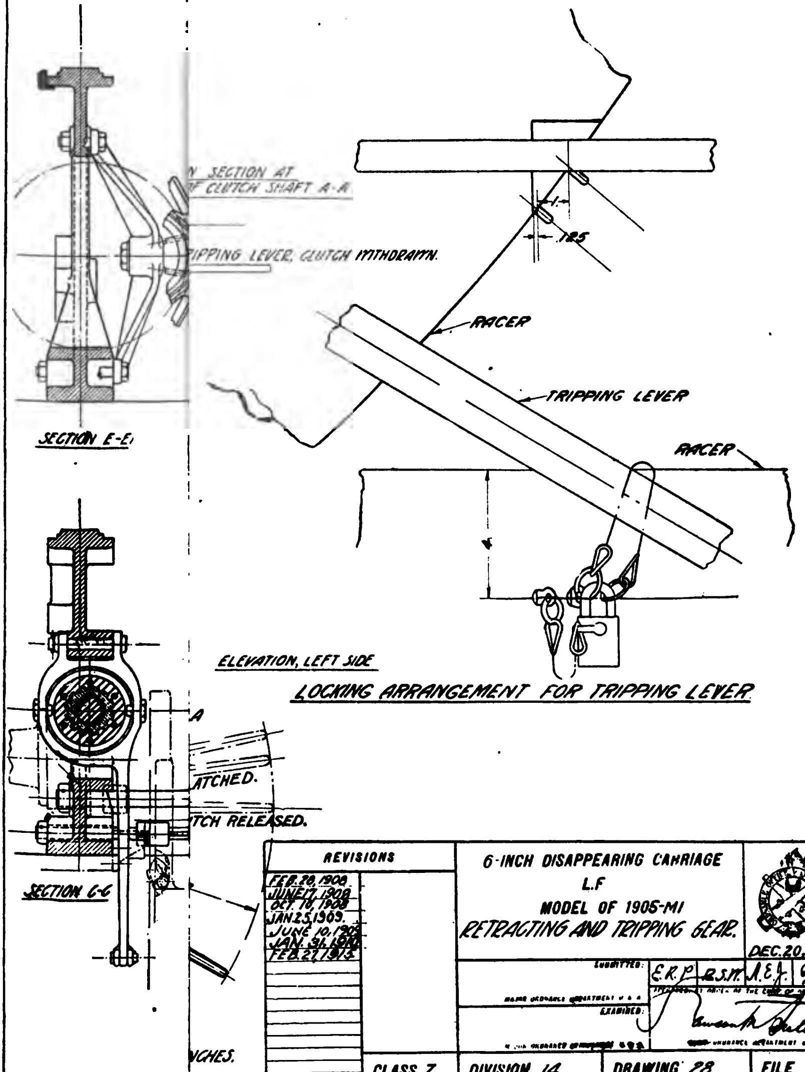

LOCKING ARRANGEMENT FOR TRIPPING LEVER

REVISIONS

FEB. 28, 1908
JUNE 17, 1908
OCT. 10, 1908
JAN. 25, 1909.
JUNE 10, 1909
JAN. 31, 1910
FEB. 27, 1915

6-INCH DISAPPEARING CARRIAGE
L.F
MODEL OF 1905-M1
RETRACTING AND TRIPPING GEAR.

DEC. 20, 1907.

SUBMITTED: E.R.P. R.S.M. A.E.J. G.M.
MAJOR ORDNANCE DEPARTMENT U.S.A.
EXAMINED:
APPROVED BY ORDER OF THE CHIEF OF ORDNANCE.
ORDNANCE DEPARTMENT U.S.A.

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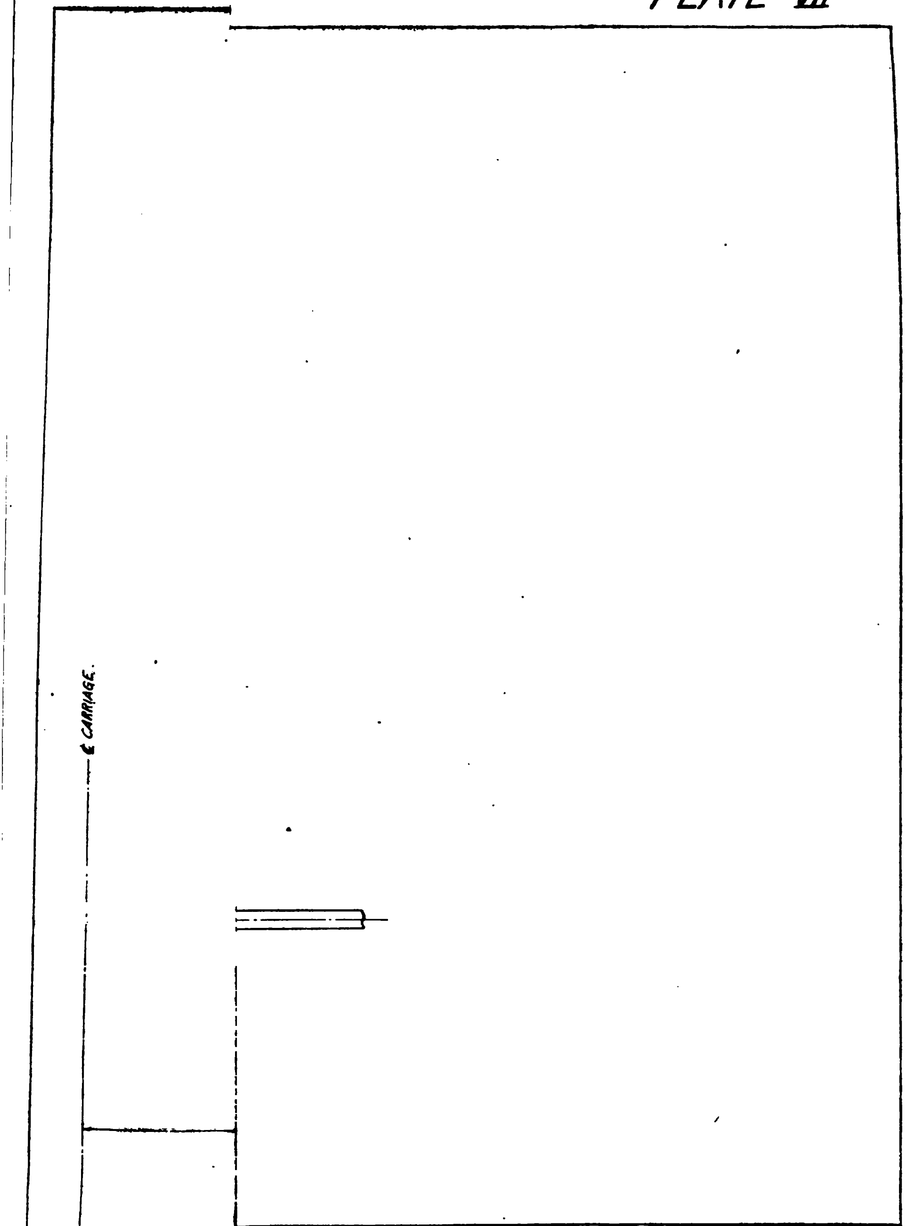
PLATE XIX.

PLATE VII



PERTAINS TO		REVISIONS	
DIV.	AS PLATE		

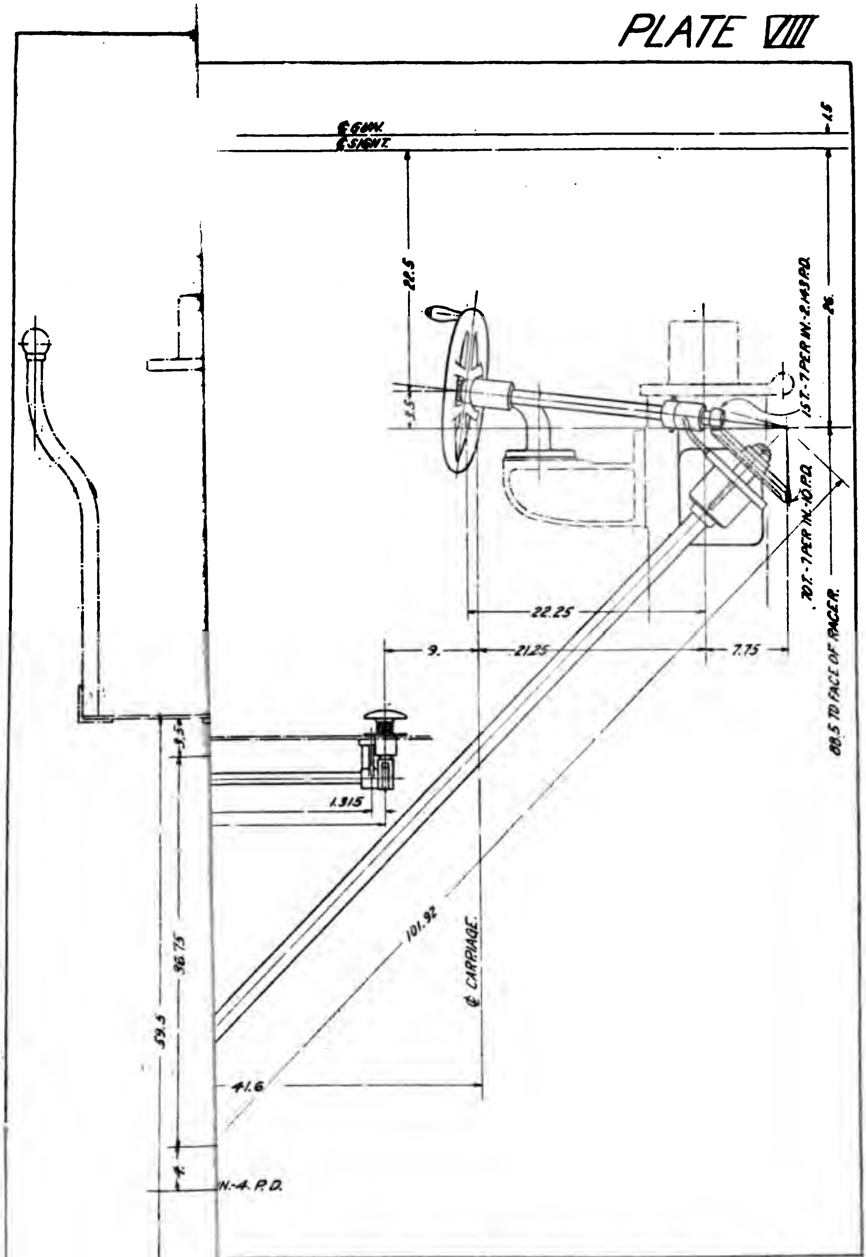
6 INCH DISAPPEARING CARRIAGE,
L.F.
MODEL OF 1905MI.
ELEVATING GEAR.

NOV. 14, 1908.

SUBMITTED: B.A.B.
MAJOR ORDNANCE DEPARTMENT, U. S. A.
EXAMINED:
MAJOR ORDNANCE DEPARTMENT, U. S. A.
APPROVED: BY ORDER OF THE CHIEF OF ORDNANCE
J.W. Rice
MAJOR ORDNANCE DEPARTMENT, U. S. A.

CLASS 7 | DIVISION 14. | DRAWING 33 | FILE

PLATE VIII



ERTAINS TO		REVISIONS	
DIV.	AS PLATE	DEC. 20, 1907 FEB. 28, 1908 APRIL 20, 1908	

6-INCH DISAPPEARING CARRIAGE
L.F.
MODEL OF 1905 M1.
TRAVERSING GEAR

NOV. 12, 1907.

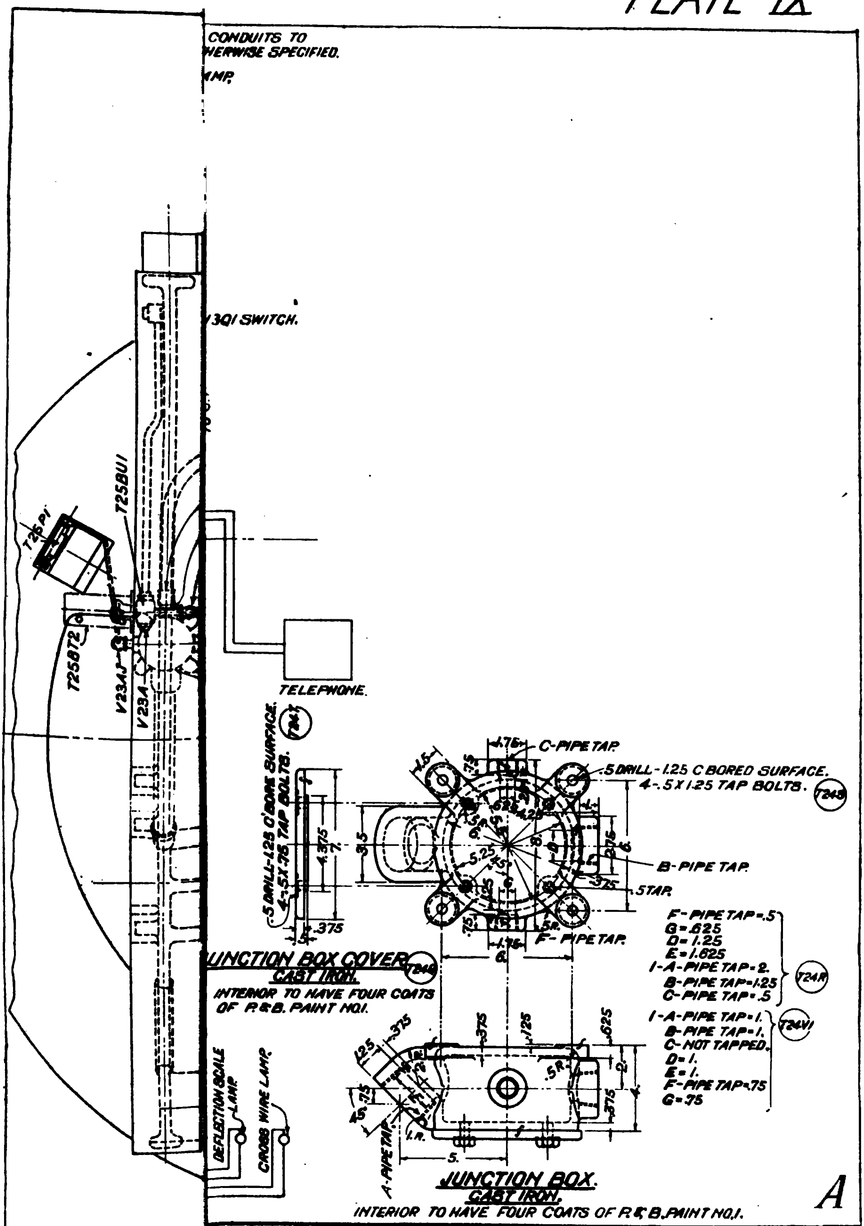
SUBMITTED
MAJOR ORDNANCE DEPARTMENT, U.S.A.
E.M.W. J.B.C.

EXAMINED
MAJOR ORDNANCE DEPARTMENT, U.S.A.

APPROVED BY ORDER OF THE CHIEF OF ORDNANCE
Lawson M. Fuller
MAJOR ORDNANCE DEPARTMENT, U.S.A.

CLASS 7 | DIVISION 14 | DRAWING 26 | FILE

PLATE IX



C. PER- NS TO SS	DIV.		REVISIONS
			MAR. 15, 1906
	14		OCT. 10, 1906
	15		JULY 15, 1907
			DEC. 20, 1907
			APR. 20, 1908
			OCT. 10, 1908
			DEC. 1, 1909
			NOV. 12, 1910
			MAR. 23, 1912
			MAY 10, 1913
			MAR. 18, 1914
			DEC. 21, 1914
		13	FEB. 23, 1917

CONDUITS FOR
6 INCH DISAPPEARING CARRIAGE
L.F. MODEL OF 1905MI AND 1905MII
PLAN AND WIRING DIAGRAM

WATERTOWN ARSENAL, U.S.A. NOV. 1, 1905

SUBMITTED:

ORDNANCE DEPARTMENT U.S.A.

EXAMINED:

ORDNANCE DEPARTMENT U.S.A.

APPROVED BY ORDER OF THE CHIEF OF ORDNANCE

MAJOR, ORDNANCE DEPARTMENT, U.S.A.

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